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ABSTRACT

The junior high school, comprised of grades 7-9, was originally organized to meet the special needs of adolescent students. Current trends in school reorganization favor a middle school comprised of grades 6-8, raising the problem of where to place the ninth grade in the school organization. Assuming that ninth graders should be placed with students more nearly resembling themselves, a test was made of the research hypothesis that ninth grade students more nearly resemble tenth grade students than they do eighth grade students. From two suburban Missouri school districts, data were gathered relative to the physical, emotional, intellectual, and social maturity levels of eighth, ninth, and tenth grade students. Data analysis showed significant differences between eighth and ninth grade students in physical, intellectual, and emotional maturity. The only significant difference between ninth and tenth grade students was in physical maturity, since tenth graders were found to be more physically mature. The research hypothesis was therefore confirmed, leading to the conclusion that ninth graders would best be placed in senior high units rather than in junior high or middle school units. A 127-item bibliography of relevant literature is included. (EA)

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FINAL REPORT

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MATURITY LEVELS OF EIGHTH, NINTH AND TENTH
GRADE STUDENTS WITH IMPLICATIONS FOR
SCHOOL GRADE ORGANIZATION**

Howard W. Heding, Project Director

Norman K. Myers, Investigator

University of Missouri-Columbia

Columbia, Missouri

June 1970

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CHAPTER I

INTRODUCTION

Background

School organization and its effect on students and the learning process have been discussed for almost a hundred years. During the last decade of the Nineteenth Century and the first decade of the Twentieth, American educators recognized the need for a new type of school designed specifically for adolescent youth. Thus, the junior high school movement was born. Sixty years later, the question of the best grade organization for adolescent education is still far from resolved. A constant theme, however, that early adolescent youngsters require a type of educational environment which can best be provided in a school situation organized and equipped to meet the specific needs of this age group, has been maintained.

Traditionally, the twelve- to fifteen-year-old student group has been considered the seventh, eighth and ninth grade levels of school. This group has been given unique status because of the physical-psychological growth spurt. The experience is marked by the onset of puberty and its accompanying stresses. This period of transition between childhood and adulthood has been termed adolescence.¹ It is a period marked by diverse and often awkward changes

¹Arthur J. Jersild, The Psychology of Adolescence (New York: The Macmillan Company, 1966), p. 6.

in all facets of a young person's life. As an adolescent's body contours change, he develops an interest in the opposite sex, his emotions are erratic, social contacts grow immensely in importance, attitudes toward home and school change, parents become more difficult to get along with, he becomes moody and a fierce sense of independence begins to develop.²

There is at present, as there has been in the past, a controversy within the ranks of junior high school educators concerning the proper grade level organization for the school experience of young adolescents. The modern junior high school is generally considered to include the seventh, eighth and ninth grades. There are, however, junior high schools which include the sixth grade, some consist of only the seventh and eighth grades, and still others are part of a six-year junior-senior high school arrangement. The 7-8-9 pattern is by far the most common organization.³

Of these various organizational patterns Rankin said:

The 6-3-3 plan came into being in 1909, either in Columbus, Ohio, or in Berkeley, California. F. Stanley Hall's volumes on adolescence in 1905, the "dropout" studies by Ayers, Strayer and others in 1907-11, and other factors brought about this historic event. A change in organization was felt to be so badly needed, and the reasons for establishing a separate junior high school appeared to be so conclusive, that now over 80 per cent of the children of this age level are educated in a 6-3-3 or 6-6 plan for organization.

²Ibid., Chapter 1.

³William Van Til, Gordon Vars and John Lounsbury, Modern Education for the Junior High School Years (Indianapolis: The Bob-Merrill Company, Inc., 1967), p. 57.

Now some fifty years later school administrators and other educational leaders are re-examining the 6-3-3 plan to determine if another form of organization might not promote a better educational program. One of the most prominent organizational patterns being attempted and promoted is the 5-3-4 plan or middle school.⁴

The rather recent development of the middle school organizational concept has brought the grade organization problem into focus.

Although loosely defined, the middle school is generally considered to include the sixth, seventh and eighth grades.

A recent nationwide survey of state departments of education conducted by Cuff⁵ disclosed that the reorganization to the middle school was the result of increased enrollments, efforts toward racial integration, and community and professional pressures for restoration of the four-year high school. Cuff reported, "Few middle schools in the survey were the result of specific middle school planning, but a trend toward this was observed."⁶

As junior high school grade organization pushes downward to encompass the sixth grade as middle school proponents suggest, the old question of where the ninth grade is to be placed in modern

⁴Harold J. Rankin, Position Paper on Middle School, [ED011398 ERIC], (? : Jamesville-Dewitt Central School, 1966), p. 2.

⁵William A. Cuff, "Middle Schools on the March," Bulletin of the National Association of Secondary School Principals, 51: 82-86, February, 1967.

⁶Ibid.

school organization reappears. Authorities⁷ seem to be in general agreement that a three-year school organizational pattern for this transitional age group is to be preferred. Hence, the middle school 6-7-8 organizational pattern is replacing the junior high school 7-8-9 grade organization and displacing the ninth grade.

Specific middle school planning, and indeed any junior high school reorganizational planning, needs to recognize the educational weaknesses within the junior high school structure and rationale. Current literature suggest two factors which seem to be of primary importance: (1) the premature sophistication of early and preadolescent students prompted by junior high school programs which only miniaturize the high school;⁸ and (2) the earlier physical, emotional and intellectual maturation of students by a year or more than had been the case.⁹

⁷M. Dale Baughman, "Organization and Administration of the Modern Junior High School," Teachers College Journal, 34: 50-55, November, 1962; Gene D. Maybee, "What Do We Believe About Grades to be Included, Desirable Size, Appropriate Locations, and the Facilities for Junior High Schools?" Bulletin of the National Association of Secondary School Principals, 46: 5-7, October, 1962; and the Committee of Junior High School Education, "Recommended Grades or Years in Junior High or Middle Schools," Bulletin of the National Association of Secondary School Principals, 51: 68-70, February, 1967.

⁸J. H. Hull, "Are Junior High Schools the Answer?" Educational Leadership, 23: 213-216, December, 1965; and Richard L. Post, "Middle School: A Questionable Innovation," Clearing House, 42: 484-486, April, 1968.

⁹A. Hugh Livingston, "The Middle School," Illinois Education, 56: 345-347, April 1968; Neal C. Nickerson, Jr., "Regroup for Another Try," Minnesota Journal of Education, 47: 14-15, November, 1966; and Eugene Regan, "The Junior High School is Dead," Clearing House, 42: 150-151, November, 1967.

Of these factors Mead contended:

This emphasis on earlier and earlier participation in adult activities is superficially incongruent with the junior high school movement designed as it was to protect the young adolescent by a separate pace of slower induction into the complexities of high school life. The whole movement began when thinking in chronological age group terms had not been amplified by our knowledge of the great extremes of variation in the ages that boys and girls enter their growth spurt and enter puberty. Junior high schools were designed for children in three "grades" of school: 7th, 8th, and 9th. The grades were postulated on age and not on size, strength, or stage of puberty. They have resulted inadvertently in classifying together boys and girls at the age when they vary most, within each sex, and between the sexes, and are least suited to a segregated social existence. Also, they have divorced them from the reassurances of association with the children like their own recent past selves and older adolescents like whom they will someday become. When a type of school that was designed to cushion the shock of change in scholastic demands has become the focus of the social pressures which were once exerted in senior high school, problems have been multiplied.¹⁰

Havighurst added:

... From the base line of the earlier generation, the adolescent of today is more precocious and more complex. When we say that the modern adolescent is more precocious we mean that he has many experiences earlier than his parents had these experiences. ... He is a much more sophisticated person than ever before.¹¹

¹⁰ Margaret Mead, "Early Adolescence in the United States," Bulletin of the National Association of Secondary School Principals, 49: 5-10, April, 1965.

¹¹ Robert J. Havighurst, "Lost Innocence, Modern Junior High School Youth," Bulletin of the National Association of Secondary School Principals, 49: 1-4, April, 1965.

Bauer concurred in these analyses when he commented, "...today's adolescent is on the average slightly taller and enjoys better nutrition. He is physically healthier, perhaps more intelligent and certainly more sophisticated."¹²

Kittell summarized the situation with the observation:

All of these changes seem directly attributable to the nature of modern society: new patterns of family life, mass media, and better nutrition. Such evidence presents valid reasons for questioning the traditional grouping of grades seven, eight, and nine in the junior high school. If a separate school concept was sufficiently valid as an approach to education during preadolescence to justify the junior high school, it would seem logical now to consider seriously the inclusion of the sixth and perhaps even the fifth grade within such a separate school. At the same time some doubts are raised as to whether the ninth grade should remain as a part of the separate intermediate school. Ninth graders, according to the evidence cited above, are now equivalent to tenth graders of earlier generations. While not conclusive, recent research findings suggest sufficient similarities on factors of social, emotional, physical maturity, and opposite sex choices between sixth and seventh graders to warrant consideration of new age groupings under the separate school concept.¹³

Statement of the Problem

The hypothesized earlier onset of adolescent maturational development raises many questions of vital concern to educators. The primary concern posed is represented by the question: Does the conventional junior high school 7-8-9 grade organization and

¹²Francis Bauer, "Causes of Conflict," Bulletin of the National Association of Secondary School Principals, 49: 15-18, April, 1965.

¹³Jack E. Kittell, "Changing Patterns of Education: The 'Middle School' Years," The College of Education Record, 33: 62-68, 1967.

program adequately provide for the maturational differences of seventh, eighth and ninth grade students? It was to this basic issue this investigation was addressed.

The problem of this study was to provide a scientific basis for school grade level reorganizational planning by determining whether students in the seventh, eighth and ninth grades were as homogeneous a group with regard to maturity levels as the traditional junior high school 7-8-9 grade organization and program would assume. Within the framework of this general problem, the objectives of this study were to ascertain the differences among students enrolled in the eighth, ninth and tenth grades of suburban junior and senior high schools with respect to their levels of physical maturity, intellectual maturity, emotional maturity and social maturity. An additional aspect of the study was to ascertain whether ninth grade students, when compared on the criterion variables of physical, intellectual, emotional and social maturity levels more resemble tenth grade students than they resemble eighth grade students.

Purpose of the Study

The central purpose of this study was to collect information about physical, intellectual, emotional and social maturity levels of eighth, ninth and tenth grade students which may be analyzed and used so that more valid decisions might be made about the grade organization and programs of the junior high school.

The following questions were asked of the data:

1. To what extent, if any, is each of the four maturational elements of physical, intellectual, emotional and social maturity a significant factor in eighth, ninth and tenth grade student differences when sex differences are controlled?
2. To what extent do significant differences exist between students, as differentiated by sex, with respect to physical, intellectual, emotional and social maturity?
3. Are ninth grade students significantly different from eighth grade students on any or all of the variables of physical, intellectual, emotional and social maturity?
4. Are ninth grade students significantly different from tenth grade students on any or all of the variables of physical, intellectual, emotional and social maturity?

The answers to these questions provided the bases for the conclusions of this research. The nature of the questions posed above were such that statistical and other analyses could be made.

Assumptions

In this study it was assumed that the primary elements of adolescent growth were physical, intellectual, emotional and social maturity. It was further assumed that as these primary elements evolve through the adolescent growth processes, their level of development was measurable through the use of the instruments and techniques selected.

Additionally, it was assumed that the randomized selection procedures used for sample subject selection would minimize the effects of variables not otherwise controlled by the design. The

assumption was also made that the criterion variables used in measuring the degree of pubescence were components of physical maturity.

Need for the Study

The specific questions to which this study sought answers were part of a larger structure of complex factors affecting adolescent education. Among the many factors considered in determining whether the ninth grade is placed better in the 7-9 junior high school unit or in a 9-12 senior high school unit were the common maturity levels held by the student body. The ultimate purpose of any grade organization scheme is to make possible the best teaching-learning situation. Presumably, a school grade should be placed where the needs of the largest proportion of pupils assigned to it are best served.

As more and more interest and research is generated concerning the middle school, there develops a problem in organizational terms, of where to place the ninth grade. Instead of developing school organizational patterns and plans on non-educational bases as Cuff found to be the case for many middle schools,¹⁴ a rationale must be developed, based upon valid research, to be the foundation for any reorganization scheme affecting the ninth grade.

The maturational level of the adolescent student was a part of the rationale to be developed, and data reporting maturation

¹⁴Cuff, loc. cit.

levels of eighth, ninth and tenth grade pupils were necessary for the systematic development of such a rationale. The 49th Yearbook of the National Society for the Study of Educational forcefully presented the importance of the maturational element when it declared that one of the four major factors influencing instruction is the maturity level of the students.¹⁵

The Committee on Junior High School Education of the National Association of Secondary School Principals has stated:

Administrative organization needs to be determined on educational grounds, rather than for such reasons as building expediency, economy, or racial imbalance. Nor is a special reorganization of units essential for encouraging needed educational reforms. . . . The Committee urges the importance of research regarding such all important matters as present levels of physical and social maturation of pupils, what determines quality in educational programs, and the special characteristics of existing grade organizations. In the meantime every community that contemplates an organizational change is urged to obtain evidence regarding maturation patterns of its children in deciding whether a 5-8, 6-8, or 6-9 school is likely to be as satisfactory an educational unit as the 7-9 school has been.¹⁶

Crow and Crow have classified youth's developmental patterns of maturation into childhood, pre-adolescence, early adolescence, and latter adolescence stages.¹⁷

¹⁵ National Society for the Study of Education, Learning and Instruction, 49th Yearbook, Part I, University of Chicago, 1950, p. 223.

¹⁶ Committee on Junior High School Education, loc. cit.

¹⁷ Lester Crow and Olive Crow, Adolescent Development and Adjustment (New York: McGraw-Hill Book Company, Inc., 1956).

Of these classifications, Shirts observed:

For many years we have assumed that the ninth-grade group, fourteen-year-olds, fits somewhere in the preadolescent age. It would seem more appropriate that they be placed at the beginning or in the early adolescent period as they are demonstrating or will demonstrate around this period most of the characteristics attributed to adolescent youth.¹⁸

He concluded:

We may be fallaciously assuming that, since only a few of them reach this period (puberty) at any given time, they should be classified in the preadolescent period. Perhaps we should re-examine this thinking with the possibility of placing them in the early adolescent age group of our organizational structure.¹⁹

This earlier physical and intellectual maturation upon which the need for a re-evaluation of the adolescent school grade organization is founded, has been substantiated by Meredith, Tanner, Binning, and others. In 1963, Meredith reported:

Over the last several decades, the distribution for body weight of North American white boys has undergone upward displacement at all ages between 7 years and 15 years. Magnitude of displacement has varied systematically in two respects, having (1) increased with age from childhood into early adolescence, and (2) increased less toward the lighter end of each distribution than toward the heavier end. At age 15 years, mean body weight of North American young men ... has increased during the last 85 years more than 35 per cent. Between 1870 and 1955 the North American white

¹⁸Morris A. Shirts, "Ninth Grade--Curriculum Misfits?", Bulletin of the National Association of Secondary School Principals, 41: 135-137, November, 1957.

¹⁹Ibid.

male age 15 years became taller by 5.2 - 6.2 inches in absolute mean stature, or 8.5 - 10.1 per cent in relative mean stature.²⁰

Of adolescent girls Tanner found:

During the last hundred years in Western Europe and America there has been a marked trend towards an earlier age of occurrence of menarche. Menarche has been getting earlier by some 4 months per decade. This trend is illustrated from records which indicate average age at menarche from Norway, Germany, Finland, Sweden, Denmark, Great Britain and the United States ranging from 1830 to 1960.²¹

Tanner has written:

The secular (growth) trend, both in earlier maturation and in greater size, is one of the most considerable phenomena of human biology at present, and has, into the bargain, a host of medical educational, and sociological consequences.²²

Binning's study of earlier maturity disclosed:

The faster growth in height and weight (measured) in 1956 was accompanied by greater mental age on testing... and probably by an accompanying advance to an earlier age at the onset of puberty.

When the speed of physical growth is increased one would expect to find the speed of mental growth to be increased and to be manifest on testing with the intelligence tests as an increase in mental age,

²⁰Howard V. Meredith, "Changes in Stature and Body Weight in North American Boys During the Last 80 Years," Advances in Child Development and Behavior, 1: 85-101, 1963.

²¹J. M. Tanner, "The Development of the Female Reproductive System During Adolescence," Clinical Obstetrics and Gynecology, 3: 135-145, March, 1960.

²²J. M. Tanner, Education and Physical Growth (London: University of London Press, Ltd., 1961), p. 111.

and, because chronological age has been kept stationary, by a raised intelligence quotient.²³

A thorough review of the literature substantiated the need to provide a foundation, supported by valid research into maturity levels of eighth, ninth and tenth grade students, on which the formulation of decisions and plans for an educationally and maturationally sound grade reorganization of junior high schools could be based. Only through the process of actual measurement could empirical evidence be acquired which would provide the answers needed to improve the teaching-learning situation through possible reorganization of the grade structure on a rational basis.

Limitations of the Study

The research findings were limited to the extent which the criterion variables of physical, intellectual, emotional and social maturity levels reflect the true elements which comprise the general maturity level of adolescents.

A further limitation of this study was in the application of the Puberty Rating Scale which was utilized to measure the physical maturity variable.

The fact that the study population consisted of middle-class, white, suburban school children is a limitation on generalizations derived from the findings. Therefore, generalizations arising from

²³Griffith Binning, "Earlier Physical and Mental Maturity Among Saskatoon Public School Children," Canadian Journal of Public Health, 49: 9-17, January, 1958.

the study data and findings were limited to the eighth, ninth, and tenth grade student population of the two St. Louis County, Missouri, school districts which participated in the investigation.

Scope of the Study

The population considered in this study consisted of eighth, ninth, and tenth grade students in the two suburban St. Louis County, Missouri, school districts which participated in the study. The random sample of 300 students was selected from the population of 1,645 eighth grade students and 1,680 ninth grade students in five junior high schools, and 1,549 tenth grade students in three senior high schools.

No attempt was made to generalize the findings to variables other than physical, intellectual, emotional and social maturity.

General Hypothesis

The general research hypothesis of this study was: ninth grade students, when compared to eighth and tenth grade students with respect to physical, intellectual, emotional and social maturity levels, more resemble tenth grade students than they resemble eighth grade students.

Definition of Terms

In establishing definitions for the various maturity levels to be measured in this study the following guidelines by Jersild have been considered:

Adolescence is a process of maturing, and, if all goes well, the individual will be more "mature" when he enters young adulthood than when he entered

the adolescent phase of growth. However, the concept of maturity as related to adolescents should not be regarded as denoting a fixed state or an end point in the process of development. Maturity is a relative term, denoting the degree to which, at any juncture of his life, a person has discovered and is able to employ the resources that become available to him in the process of growth.

Maturity is, in part, a biological product: it is linked with the maturation of the organism. Maturity is also the product of learning: it is only through training, discipline and experience that a person's psychological potentials can be put to use. Maturity is, in addition, a cultural concept, for when we assess a person's maturity we do so in large measure, in terms of standards and values of the culture in which we live.

In assessing maturity in this or that sphere of life (mental, social, moral, and emotional), it is essential to take account of the level attained by the normal or typical person and also to consider the condition of exceptional persons: those who do not measure up to normal standards and those who exceed these standards.²⁴

Physical maturity level - a point on the human physical growth and development continuum reached by a student at any given time. The continuum ranges from the undeveloped physical and sexual level of the infant to the completely developed level of the mature adult individual.

Intellectual maturity level - the degree to which the student is able to form rational judgments, reason logically, perceive relations, deal with abstractions, conceptualize, and relate to long term goals.²⁵

²⁴Jersild, op. cit., p. 399.

²⁵Ibid., p. 400.

Emotional maturity level - that level or degree to which a student has developed emotionally along a continuum from the immature stage of feeling unworthy of others, of substantial dependence on others for direction, of self-concern and loneliness, of indulgence in fantasy, of feeling rejected by family and friends, of exhibitions of nervous symptoms to the mature stage of self-reliance, sense of personal capability, cordial relationships with family and peers, feeling of belonging and freedom from excessive nervousness.²⁶

Social maturity level - that level or degree to which a student has developed socially along a continuum from immature bullying, insecurity, selfishness, blind loyalty to friends and uncooperativeness to the mature recognition of desirable social standards, need to subordinate self to the group, cooperative attitudes, independence of judgment and sense of personal responsibility.²⁷

Eighth grade students - those students who are enrolled in the eighth full year of school work in a school district organized with a K-12 program.

Ninth grade students - those students who are enrolled in the ninth full year of school work in a school district organized with a K-12 program.

²⁶Louis P. Thorpe, Willis W. Clark and Ernest W. Tiegs, Manual, California Test of Personality, California Test Bureau, Los Angeles, 1953, p. 3.

²⁷Ibid.

Tenth grade students - those students who are enrolled in the tenth full year of school work in a school district organized with a K-12 program.

Organization of the Study

This study consists of five chapters, a bibliography, and an appendix.

Chapter II deals with the research related to the study. Included are summaries and representative synopses of studies concerning organizational patterns of schools; studies which analyzed the physical, intellectual, emotional and social facets of adolescence; and the more recent investigations into the relationship between adolescent maturity variables and school grade organization.

Chapter III sets forth the research procedures of the study including variable controls, data gathering techniques, instrumentation, and statistical procedures for data analysis.

Chapter IV contains the analysis made of the maturity variable data in relation to grade level differences, sex differences, specific differences between eighth and ninth grade students and between ninth and tenth grade students.

Chapter V consists of the study summary, conclusions drawn from the data analyses and suggested implications for school grade organization.

CHAPTER II

REVIEW OF RELATED LITERATURE

The origin and development of the junior high school movement has been widely recognized and documented. It is sufficient here to only briefly mention the points of historical significance which lend perspective to the study.

As early as 1872, President Charles W. Eliot of Harvard began attacking the 8-4 school organization scheme. He was confident that the period of elementary schooling was too long and the length of secondary schooling too short, under the 8-4 plan, for college students to be adequately prepared to do college work.²⁸ President Eliot's address to the National Education Association in 1892 led to a succession of National Education Association committee meetings in 1893, 1895, 1907 and 1909 which consolidated plans for the reorganization of school systems. Stirred by the writings of G. Stanley Hall and others, educators began experimenting in the early decades of this century with the concept of a separate school as a solution to the problem of providing appropriate, effective educational experiences for young people who were passing from childhood, through pubescence, and into adolescence. The merging of these two movements ushered in the era of the 6-3-3 and 6-6 organization plans. Grebe in his study of vertical school

²⁸Charles W. Eliot, Educational Reform: Essays and Addresses (New York: The Century Company, 1898), pp. 151-176.

organization for adolescents, recounts in some detail the various committee decisions and resultant influence on school reorganization in the period from 1888 to 1920.²⁹

School Grade Organization

Various studies, through the years, have been conducted in an attempt to decide which plan, or plans, was best in providing the most effective education for students. In 1941, The Encyclopedia of Educational Research stated:

A number of studies comparing six-year reorganized schools with regular high schools have been made. These investigations usually employed indirect measures. The results were mostly inconclusive, with little difference found between the traditional and the reorganized schools.³⁰

Studies of this type were exemplified by Bear's³¹ examination of the distinctiveness of small six-year high schools; Shannon's³² study of unexploited opportunities in six-year schools; and,

²⁹Earl L. Grebe, "Vertical School Organization for Young Adolescents in Selected Missouri Public Schools" (unpublished Doctoral dissertation, University of Missouri-Columbia, 1967), pp. 39-57.

³⁰Walter S. Monroe (ed.), Encyclopedia of Educational Research (New York: The Macmillan Company, 1941), p. 1081.

³¹R. M. Bear, "How Distinctive are Small Six-Year High Schools?", School Review, 40: 372-380, 1932.

³²J. R. Shannon, "An Unexploited Opportunity in the Six-Year High School," School Review, 36: 745-756, 1928.

Spaulding, Frederick and Koos,³³ survey of major types of secondary school organization for determination of those with greatest promise.

Later opinionnaire-questionnaire and inquiry type studies of school organizational patterns reported that the existing forms of secondary school organization continued to be based on opinion rather than fact. Examples are Wood³⁴ in 1951; Reese³⁵ in 1956; and Conant³⁶ in 1959, which all concluded that the 6-3-3 pattern was best for junior high schools.

The Reese study compared various aspects of the three-year junior high school with the six-year junior-senior high school. A total of 1,084 ninth-grade pupils, 781 parents and 159 teachers in a midwestern city that had both types of schools was involved. Results of the opinionnaire portion of the survey showed that pupils,

³³F. T. Spaulding, O. I. Frederick and L. V. Koos, The Reorganization of Secondary Education (Washington, D. C: U. S. Government Printing Office, Bulletin Number 17, Monograph Number 5, 1932).

³⁴W. C. Wood, "An Analysis of the Structural Organization of the Public Schools," (unpublished Doctoral dissertation, University of Colorado, Boulder, 1951).

³⁵Jerald L. Reese, "An Evaluation of Two Types of Vertical School Organization in a Selected School System," Dissertation Abstracts, 21: 2179-2180, February-April, 1961.

³⁶Preliminary Report of James B. Conant to the American Association of School Administrators, Atlantic City, 1960, cited in The Nation's Schools, 15: 82, April, 1960.

parents, and teachers all rather strongly preferred a separate junior high school organization for seventh, eighth and ninth graders.³⁷

In 1962 Yost designed a study to gather information relating to the different varieties of junior high school organization in the state of Texas. It revealed, for example, that of the schools studied 54.1 per cent had a 7-8-9 plan of organization, 20.6 per cent had a 7-8 plan, and 20 per cent had a 6-7-8 plan.³⁸ He concluded that there appeared to be general agreement that:

1. Existing facilities help to determine local practice.
2. The Carnegie Unit system is a controlling factor in that it restricts flexibility in grade nine.
3. Which age levels to include in the junior high unit is an important problem and it deserves careful consideration.
4. Whether ninth grade students should be in high school or in junior high presents the most difficult problem.
5. Many aspects of the activity program are influenced by the inclusion of the ninth grade.
6. A saving of money on special facilities, such as laboratories, would result from the placement of the ninth grade in the senior high school.

³⁷Reese, op. cit.

³⁸William Yost, "Texas Survey of Junior High School Organization," The Gulf School Researcher, 9: 18-19, May, 1962.

7. The total educational and psychological growth through counseling services is greater when the ninth grade is in the junior high school.
8. Transition of students is easier in the 7-8-9 unit.
9. There may be duplicate offerings in the ninth and tenth grades when the ninth grade is in the junior high school.³⁹

The administrators of the schools studied were asked the strengths and limitations of the various types of organization. A partial summary of the findings appears in Figure 1.

Four recent studies concerning junior high school organization and placement of the ninth grade also utilized the opinionnaire-questionnaire technique. Magee's 1962 study of six-year regional high schools in Massachusetts disclosed that principals, when queried about certain problems of ninth grade students, believed that ninth grade pupils:

1. Should be elected to positions of leadership in school activities.
2. Should participate in social activities with students of the upper three grades of the high school.
3. Felt secure in the affection of their parents.
4. Had opportunities for social activities with the opposite sex.⁴⁰

In analyzing changes which took place in junior high schools of the Northeastern United States in the decade 1954-1963,

³⁹Ibid.

⁴⁰John J. Magee, "Problems and Practices of the Ninth Grade in the Six Year Regional High Schools in Massachusetts," Dissertation Abstracts, 23: 1625, October-November, 1962.

Strengths

1. Children of this age and maturity range are compatible.
2. Better counseling.
3. More opportunities for ninth graders to lead activities.
4. Better preparation for high school.
5. Less exposure of younger students to more sophisticated students.
6. The best climate for academic and athletic competition.

Limitations

1. Limitations caused by the inflexible requirements of the Carnegie Unit System.
2. Undesirable influence of older ninth grade students on the more immature seventh grade students.
3. Very wide age span with a larger number of failing students.
4. Programming difficulties (use of special facilities, scheduling for small numbers).
5. The tendency to make the 7-8-9 school a "little high school."

6-7-8 Grade Organization

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. The maturity range of 6-7-8 vs. 7-8-9 makes a transition from elementary school to high school easier. 2. More flexible scheduling is allowed since administrators are not forced to program around ninth grade. 3. Plan is good for smaller school with limited facilities. 4. Overemphasis on junior high school athletics is eliminated. 5. Sixth graders are given more responsibility. 6. The plan removes ninth graders and subsequent problems. 7. Provides a more academic approach as opposed to "little high school" idea. | <ol style="list-style-type: none"> 1. The immaturity of the sixth grade students. 2. The limitations on activities because of lack of facilities. 3. The difficulty of scheduling with sixth graders. 4. The wide variation between sixth and eighth grade students. 5. The lack of teaching materials available only in a high school. |
|---|--|

FIGURE 1

STRENGTHS AND WEAKNESSES OF 7-8-9 and 6-7-8 GRADE ORGANIZATIONS⁴¹

⁴¹Yost, loc. cit.

Zdanowicz⁴² concluded that there was some instability in grade organization, particularly in smaller schools. Seventeen per cent of the schools had changed their grade organization and nearly as many contemplated future changes. The usual reason for change was administrative necessity, and there appeared to be some interest in organizing three-year middle schools.

The major hypothesis of Coon's⁴³ study of school organizational patterns encompassing grade nine in Pennsylvania was that no differences would be found in the curriculum, out-of-class activities, or guidance services which were associated with grade patterns of organization. This hypothesis was rejected on the basis that type of grade organization does influence satisfaction with curricular offering. Additionally, it was found that a majority of the principals preferred to place the ninth grade as the first year of a four-year high school.

Stoffler⁴⁴ examined the relationship between the functions of the junior high school as determined from the professional

⁴²Paul J. Zdanowicz, "A Study of the Changes That Have Taken Place in the Junior High Schools of Northeastern United States During the Last Decade," Dissertation Abstracts, 26: 5192, March-April, 1966.

⁴³Nile D. Coon, "Educational Outcomes Resulting From Three Administrative Organizational Patterns Encompassing Grade Nine," Dissertation Abstracts, 27: 2767-A, January-March, 1967.

⁴⁴James A. Stoffler, "The Relationship of Recommended Junior High School Functions and Educational Practices in the Illinois Schools in 1961 and 1966," Dissertation Abstracts, 28: 2000-A, October-December, 1967.

literature, and educational practices in Illinois schools in 1961 and 1966. Among his conclusions was that none of the one hundred and nine educational practices investigated was found to be significantly related to the type of grade organization of the schools in either 1961 or 1966.

Little experimental research has been done in this area. The research available was largely an assemblage of opinions held by leading educators. There was a paucity of research undertaken to specifically determine the best grade combinations in terms of student needs and interests.

Adolescent Physical Maturity

Physical Maturity. A number of studies were made prior to 1920 which attempted to establish the significance of the relationship between pubescent status and the education process. Studies by Crampton,⁴⁵ Baldwin,⁴⁶ and Stewart⁴⁷ showed high correlations between scholarship and pubescence.

⁴⁵C. Ward Crampton, "Anatomical or Physiological Age Versus Chronological Age," Pedagogical Seminary, 15: 230-237, 1908.

⁴⁶B. T. Baldwin, "A Measuring Scale for Physical Growth and Physiological Age," The Fifteenth Yearbook of the National Association for the Study of Education: Part I (Bloomington, Illinois: Public School Publishing Company, 1916), p. 40.

⁴⁷S. F. Stewart, "A Study of Physical Growth and School Standing of Boys," Journal of Educational Psychology, 7: 414-426, 1916.

Meredith has characterized the physical changes which accompany adolescence by saying:

Termination of childhood is signified by increase in the growth rates for size of breasts, ovaries, and uterus in the girl; size of testes, scrotum, and penis in the boy; and, in both sexes, size of shoulders and hips, arms and legs, height, and total body mass. Other puberal changes include beginning menstruation by the girl, voice change and growth of facial hair by the boy, and development by both sexes of moderately coarse pigmented hair in the armpit and groin regions.⁴⁸

Strang summarized data on the ages at which puberty is attained by boys and girls in the following statement:

...It is around 15 1/2 years, or in the ninth grade that teachers find the greatest diversity: the majority of girls will have obtained biological maturity; a smaller portion of the boys will have reached maturity; about a third of the boys will be passing through puberty; and a few will still be children.⁴⁹

Cole⁵⁰ has constructed, from several studies, two comparisons of age at maturity, by sex. She found differences in the rate of growth over the period from 1910 to 1954. She also noted that boys reached maturity about two years later than girls which accounted for the period in which the proportion of mature girls was far larger than the proportion of mature boys. Meredith's

⁴⁸Howard V. Meredith, "A Synopsis of Puberal Changes in Youth," The Journal of School Health, 37: 171-178, April, 1967.

⁴⁹Ruth Strang, The Adolescent Views Himself (New York: McGraw-Hill Book Company, 1957), p. 240.

⁵⁰Luella Cole, Psychology of Adolescence (New York: Holt, Rinehart and Winston, Inc., 1964), p. 67.

synopsis of pubertal changes in youth concurs with this two-year advance for girls for pubertal changes common to both sexes.⁵¹

Marshall and Tanner in 1968, examined the most recent biological data and concluded:

Evidence that the age at which children reach adolescence has been getting earlier over the past century has been reviewed and extensive data from many parts of the world leave no doubt as to the reality of this "secular trend." The underlying causes of the trend are not fully understood, but in the case of earlier adolescence they are probably in the main environmental, while genetic factors may play a more important part in the trend towards increasing final height in adults.⁵²

Puberty in Females. Of the many physical changes which occur during female adolescence Brown has written:

The menarche is the most obvious and the most easily ascertained sign of puberty in girls. No parallel event occurs in boys. For this reason comparative studies on the average age at onset of menstruation such as those given by Tanner provide the greater part of the evidence in support of the view that children are maturing earlier than they used to.⁵³

Brown reported, as shown in Table I, the percentage of girls in each of the following surveys who had started menstruating by the time they had reached a given birthday together with the average age at onset of menstruation and range of ages:⁵⁴

⁵¹Meredith, op. cit.

⁵²W. A. Marshall and J. M. Tanner, "Growth and Physiological Development During Adolescence," Annual Review of Medicine, 19: 283-300, 1968.

⁵³P. E. Brown, "The Age at Menarche," British Journal of Preventive and Social Medicine, 20: 9-14, 1966.

⁵⁴Ibid.

TABLE I
PERCENTAGE OF GIRLS MENSTRUATING BY A GIVEN BIRTHDAY⁵⁵

1. Kiil - Oslo school-girls in 1928 and 1952.
2. Waddy - Birmingham maternity hospital patients in the period covering approximately 1830-45.
3. Unpublished data from a survey of elderly persons in Sheffield. In 1949-51, 257 women between the age of 60 and 85 were questioned as to the age of menarche, the data thus refer to the period around 1890.
4. Wilson and Sutherland - Oxford school girls in city and county in 1949.
5. Unpublished data obtained during a thyroid survey in the West Riding of Yorkshire in 1962. Six hundred eighty-five girls between the ages of 15 and 19 years were questioned about the year and month in which they started menstruating.

Brown noted that the proportion of girls menstruating before their tenth and eleventh birthdays is much the same in all the surveys. The downward trend does not become fully evident until the position at the 14th birthday is examined. The range of ages, then, starts at the 9th or 10th year in all the surveys, and the differences are seen at the end of the range which varies from 16 to 23 years. The most obvious difference in the eight series shown in Table I is in the range of ages over which menstruation started. In some of the later series all the girls had started by 17 or 18 years. In the 19th century series, the onset for some individuals was delayed until 20 years or more. No comparable differences are found at the lower end of the range. A characteristic of the change which has taken place in the last 100 years is, therefore, the disappearance of individuals with a late onset of menstruation and a consequent

closing up of the distribution in the direction of the lower end of the range. There is no evidence that the lower limit of the range itself has extended downwards.⁵⁶

Figure 2 presents the two Oslo distributions in comparison. The 1952 distribution is similar to that representing the 1928 distribution but appears to have shifted to the lower left along the horizontal axis without a change in slope, indicating a similar spurt in physiological change, but earlier menarche. The Birmingham, Sheffield, Oxford City, and West City, England distributions are compared in Figure 3.

In explanation of these comparisons Brown said:

In the majority of surveys the girls were asked to recall the age at which they began menstruating, but in the Norwegian surveys groups of girls of different ages were asked whether or not they had started. Each age group, therefore, represents a separate sample of girls and the apparent falling off of the percentage menstruating after the age of 16 in the 1952 Oslo data is presumably due to sampling error. In the Sheffield series the period of recall was, of course, in the region of 50 years. Of 257 questioned, 236 gave positive replies, twenty said they could not remember, and one said she never had menstruated.⁵⁷

Little variation is reported in other recent literature as to the ages at which the menarche is experienced by girls. Pubescence (onset of menstruation), it is generally agreed, occurs at approximately age thirteen. Studies confirming this approximation of

⁵⁶Ibid.

⁵⁷Ibid.

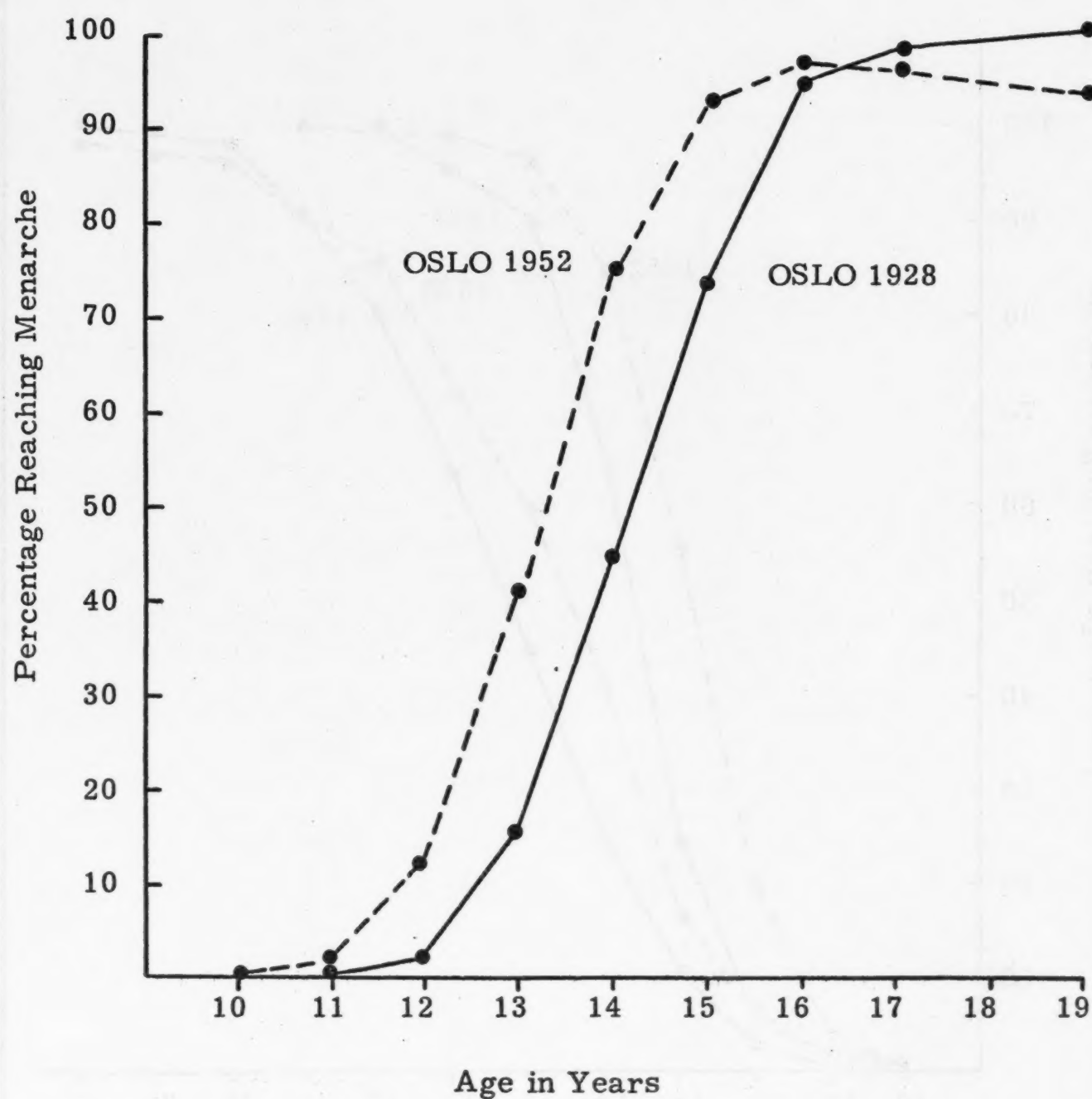


FIGURE 2

PERCENTAGE OF GIRLS MENSTRUATING AT A GIVEN AGE IN
OSLO, 1928 and 1952 (KIIL, 1953)⁵⁸

⁵⁸Ibid.

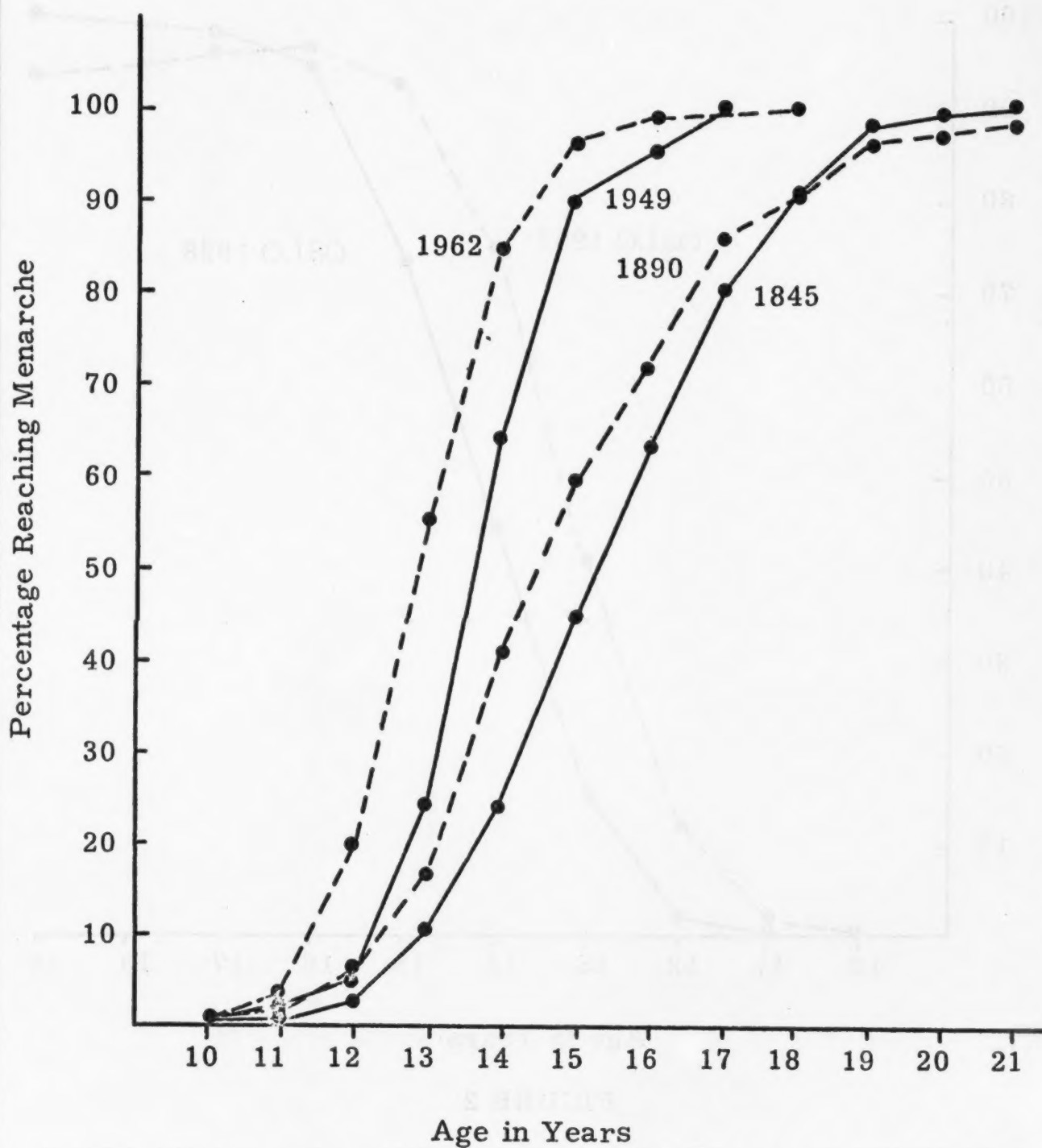


FIGURE 3

PERCENTAGE OF GIRLS MENSTRUATING AT A GIVEN AGE IN
 ENGLAND, 1845 (WADDY, 1846), 1890 and 1949⁵⁹
 (WILSON AND SUTHERLAND, 1949), and 1962

⁵⁹Ibid.

menarcheal age have been conducted by Nicolson and Hanley,⁶⁰ MacFarlane,⁶¹ and Shuttleworth,⁶² among others.

With regard to age at menarche, Meredith reported:

Among present day white girls, variations are about as follows: fully 50 per cent reach menarche between ages 12 and 14 years, approximately 80 per cent reach menarche between ages 11.5 and 14.5 years, and more than 95 per cent reach menarche between ages 10 and 16 years, and fewer than 2 per cent reach menarche between age 8 and 10 years, and fewer than 2 per cent reach menarche after age 16 years. Menarche variations for American Negro girls are similar to those for white girls.... There have been many more investigations on age at menarche (occurrence of the first menstrual cycle) than on pubescent hair growth or breast development. A century ago, the average age at which menarche occurred in white girls was 14.5 years or later. Recent studies on large samples of Australian, British, Hungarian, Polish and Russian girls indicate that today the average age at which the white girls reach menarche is approximately 13 years.⁶³

A tabulation of the mean age of menarche in various countries with reference to sources of data is shown in Table II. These data support the conclusions of other studies of menarcheal age.

In reference to secondary sex characteristics Jersild said:

Breast development is the most apparent of the secondary sex characteristics in the developing girl.

⁶⁰ Arline B. Nicolson and Charles Hanley, "Indices of Physiological Maturity: Deviation and Interrelationships," Child Development, 24: 19-20, March, 1953.

⁶¹ Crow and Crow, loc. cit.

⁶² F. K. Shuttleworth, Sexual Maturation and the Physical Growth of Girls Age Six to Nineteen, Monograph of the Society for Research in Child Development, II, Number 5, 1937.

⁶³ Meredith, op. cit., p. 172.

TABLE II

AGE OF MENARCHE IN RECENT YEARS⁶⁴

Country		Year	Mean Age and S. E.
Norway	Oslo	1952	13.4
Denmark	Copenhagen	1950	13.8 +0.3
	Copenhagen	1963	13.1 ±0.12
Holland		1956	13.7 ±0.06
Switzerland	Basle	1956	13.5 ±0.10
England	London	1959	13.1 ±0.02
	Bristol	1956	13.2 ±0.02
Scotland	Edinburgh	1952	13.4 —
Hungary	Budapest	1959	12.8 +0.08
	Szeged	1961	13.0 —
	All	1959	13.2 +0.02
Poland	Warsaw	1965	13.0 ±0.04
	Wroclaw	1961	12.6 ±0.06
Rumania	3 towns	1963	13.5 ±0.06
	3 village areas		14.6 ±0.07
	Constana	1965	13.79 ±1.22
Yugoslavia	Zemun	1963	14.3 ±0.06
France	All	1950	13.5 ±0.01
U. S. A.	California	1950	12.8 ±0.12
Cuba	Negro	1963	12.3 ±0.08
	White		12.4 ±0.03
	Mulatto		12.4 ±0.06
Chinese	Hong Kong	1962	
	rich		12.5 +0.18
	average		12.8 ±0.20
	poor		13.3 ±0.19
Burma and Assam		1957	13.2 ±0.08
Ceylon	Colombo	1950	12.8 ±0.07
	rural		14.4 ±0.16
Nigeria	Ibo (well off)	1960	14.1 ±0.16
East Africa	Kampala (well off)	1960	13.4 ±0.16
South Africa	Bantu	1958	15.0 ±0.03
New Guinea	Bundi	1964	18.8 ±0.33
South India	Madras (Urban)	1965	12.8 ±0.14
	Madras (Rural)		14.2 ±0.13
	Kerala (Urban)		13.2 ±0.17
	Kerala (Rural)		14.4 ±0.14
Australia	Melbourne	1966	13.2 ±0.90
U. S. S. R.	Moscow	1965	13.0 —

⁶⁴Marshall and Tanner, op. cit., p. 295.

There is considerable variability in the timing and outcome of this development. The breasts of most girls have progressed from the beginning bud stage to a more mature stage before menarche. Breast development more often precedes than follows appearance of pubic hair, but in some girls the pubic hair appears first, and in some the two developments occur together.⁶⁵

Reynolds and Wines studied a group of girls continuously over a period of years to determine the various stages of maturational development including the secondary sex characteristics.⁶⁶

Basing his conclusions on secondary sex characteristic research studies by Boynton,⁶⁷ Meredith,⁶⁸ and Shuttleworth,⁶⁹

Meredith has observed:

The typical girl has an "adolescent spurt" in body height that begins shortly after age ten years and reaches its crest approximately at age 12 years; there follows a sharp velocity decline, so that by age 14 years height is increasing much more slowly than in late childhood. Similarly timed "puberal velocity humps" characterize average growth of trunk length, hip width, arm girth, leg girth, and body weight. In individual girls these puberal changes commence, fairly simultaneously, at any age from 8 years to 13 years, and on rare occasions, both earlier and later.⁷⁰

⁶⁵Jersild, op. cit., p. 78.

⁶⁶E. L. Reynolds and J. V. Wines, "Individual Differences in Physical Changes Associated with Adolescent Girls," American Journal of Diseases of Children, 75: 329-350, 1948.

⁶⁷B. Boynton, "The Physical Growth of Girls Between Birth and Eighteen Years," University of Iowa Studies in Child Welfare, 12: No. 4, 1936.

⁶⁸H. V. Meredith, "Stature of Massachusetts Children of North European and Italian Lineage," American Journal of Physical Anthropology, 24: 301-346, 1930.

⁶⁹Shuttleworth, op. cit.

⁷⁰Meredith, op. cit., p. 172.

Bryan and Greenberg⁷¹ reported the average age of beginning breast enlargement in girls was approximately 10.5 years, individual girls commencing enlargement at all ages from 2.5 years earlier to 2.5 years later. Both Reynolds and Wines⁷² and Nicolson and Hanley⁷³ found the length of time between beginning enlargement and full breast development to be about three years.

Puberty in Males. Usually the earliest externally observable indication of pubertal change in boys is an increase in the size of the testes. On the average for white boys, pubertal enlargement of the male genitalia commences shortly before age 12 years for the testes, and near age 12.5 for the penis.⁷⁴ Individual differences in age at onset of these changes extend from 9.5 years to 14.5 years for testes, and from 10 years to 15 years for the penis.⁷⁵ In most individuals pubertal penis growth begins after the onset of testicle growth, with attainment of maximum size reached in approximately five years for the penis and seven years for the testes.⁷⁶ Schonfeld

⁷¹A. H. Bryan and B. G. Greenberg, "Methodology in the Study of Physical Measurements of School Children," Human Biology, 24: 117-144, 1952.

⁷²Reynolds and Wines, loc. cit.

⁷³Nicolson and Hanley, loc. cit.

⁷⁴H. R. Stolz and L. M. Stolz, Somatic Development of Adolescent Boys (New York: The Macmillan Co., 1951), p. 537.

⁷⁵William A. Schonfeld, "Primary and Secondary Sex Characteristics," American Journal of Diseases of Children, 65: 535-549, 1943.

⁷⁶Stolz and Stolz, loc. cit.

also found that the average length of the penis almost doubles from ages 12.5 years to 17 years, and the average volume of the testes increases more than ten times from ages 12 to 19 years.⁷⁷

Crow and Crow in an assessment of the use of pubic hair appearance as an index to the pubertal status of boys stated:

According to findings obtained from the retrospective reports of some individuals or by actual examination of sexually maturing young people, the age at which pubic hair appears varies with individuals. In their studies of the beginning appearance of pubic hair among males, Crampton, Dimock, and Schonfeld, respectively, used the method of direct examination of young boys. The results of a study by Kinsey in the same area of pubertal change were based upon the retrospective reports of older men.⁷⁸

In the four studies, mean ages for attainment of puberty ranged from 13.08 to 13.45 years. The mean age, then, at which a few pigmented pubic hairs are first observable in white boys approximates 13 years. Individual boys normally manifest beginning pigmented hairs near the base of the penis sometime between ages 10 years and 16 years, with 80 per cent of boys showing this stage of development at ages 11 to 15 years.⁷⁹

Table III, from Dimock, presents the number and percentage of prepubescent, pubescent and postpubescent boys by chronological age.

⁷⁷Schonfeld, *loc. cit.*

⁷⁸Crow and Crow, *op. cit.*, p. 67.

⁷⁹H. S. Dimock, *Rediscovering the Adolescent*, New York Associated Press, 1937, p. 287.

TABLE III

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PUBESCENT STATUS IN RELATION TO CHRONOLOGICAL AGE AS JUDGED BY
PUBIC HAIR AND APPEARANCE OF THE SCROTUM⁸⁰

Chronological Age of Boys Between	Number of Boys	Prepubescent		Pubescent		Postpubescent	
		No.	%	No.	%	No.	%
10 and 11	106	104	98	1	1	1	1
11 and 12	227	188	83	32	14	7	3
12 and 13	347	215	62	86	25	46	13
13 and 14	280	112	40	80	29	88	31
14 and 15	240	32	13	52	22	156	65
15 and 16	115	2	2	9	8	104	90
16 and 17	67	0	0	0	0	67	100
17 and 18	21	0	0	0	0	21	100

Prepubescence means the period before there are any signs of puberty. In the pubescent stage, as defined by Dimock, there are pigmented hairs in the pubic region. In the postpubescent stage the pubic hair has a kink and the scrotum is wrinkled.

⁸⁰Ibid., p. 209.

Sparce development of pigmented axillary hair is exhibited by a few boys by age 11 years, most between 12 years and 16 years, and a few not until after age 17 years.⁸¹ Fourteen years is the mean age of boys at first appearance of pigmented axillary hair.⁸² This is similar to the mean age at which pigmented facial hair near the upper lip also appears.⁸³ Ramsey's 1943 study of sexual development of boys disclosed nearly the same ages for male pubescent development.⁸⁴

Adolescent Social and Emotional Maturity

Social Maturity. With reference to the relationship between adolescent social maturity and school grade organization, Gruhn and Douglas asserted:⁸⁵

The social maturity of the pupils is another consideration in deciding what grades are most satisfactory for the junior high school. Many educators and parents believe that children of twelve, thirteen, and fourteen are not sufficiently mature to participate in the social activities that are interesting and appropriate for sixteen- and seventeen-year olds.

⁸¹H. B. Richey, "The Relation of Accelerated, Normal and Retarded Puberty to the Height and Weight of School Children," Monographs of the Society for Research in Child Development, II, No. 1, 1937, p. 67.

⁸²P. E. Kubitchek, "Sexual Development of Boys With Special Reference to the Appearance of the Secondary Sexual Characters and Their Relationship to Structural and Personality Types," Journal of Nervous and Mental Disease, 76: 425-451, 1932.

⁸³Ibid.

⁸⁴Glen V. Ramsey, "The Sexual Development of Boys," American Journal of Psychology, 56: 217-233, 1943.

⁸⁵William T. Gruhn and Harl R. Douglass, The Modern Junior High School, (New York: The Ronald Press, 1957), p. 343.

Concerning the status of research in the area, they added:

Although objective evidence on this point is lacking, experience with junior and senior high school youth shows that for girls, the end of the eighth grade might be a good dividing point between the junior and senior high school, while for boys the end of the ninth grade probably is better. Obviously, it would create administrative and educational difficulties to have different grade arrangements for boys and girls.

Goins contended, and probably rightly so, that the measures of social maturity of adolescents have been largely based upon the middle-class, white, American population with little emphasis upon contrasts between urban, rural and small-town adolescents by social classes.⁸⁶ Kuhlen observed this limitation of research on adolescents in all areas of behavior and noted that research on the adolescent has yielded mainly a "psychology" of the urban middle-class adolescent.⁸⁷

In an attempt to develop a social maturity scale for adolescents in 1966, Kassoff administered his questionnaire to 204 subjects in grades 9 through 12. He reported that mean scores for each of the four subtests, Self-Concept, Relations with Peers, Relations with Adults, and External Factors, showed an increase

⁸⁶Alvin E. Goins, "Problems in the Measurement and Assessment of Social Maturity in the American Adolescent" (paper presented at the American Personnel and Guidance Association Convention, Dallas, Texas, March 20, 1967).

⁸⁷Raymond G. Kuhlen, The Psychology of Adolescent Development (New York: Harper and Brothers, 1952), Chapter 7.

with advancing age. Subtest intercorrelations were low, and he concluded that social maturity in adolescence is not a variable with a single dimension. An adolescent might exhibit mature behavior in certain areas of his living but not in others.⁸⁸

Much of the research in the area of social maturity deals with social acceptance and competence of pupils. Kuhlen and Collister found, in a study of ninth grade students, that those who were generally not well adjusted were prone to be unattractive, poorly groomed, and untutored in acceptable social practices.⁸⁹ In an earlier study by Kuhlen and Lee it was concluded that girls tended to be more active socially in early adolescence (ninth grade) and by later adolescence (twelfth grade) boys tended to dominate the social scene.⁹⁰

In a study of students from two randomly selected school systems in Indiana, Leevy⁹¹ found that girls are more socially competent at all ages than boys. Two studies of friendship

⁸⁸Arthur I. Kassoff, "Development of a Social Maturity Scale For Adolescents," Dissertation Abstracts, 27: 1927-A, 1966.

⁸⁹Raymond G. Kuhlen and E. G. Collister, "Sociometric Status of Sixth-and-Ninth-Graders Who Fail to Finish High School," Educational and Psychological Measurement, 12: 632-637, Winter, 1952.

⁹⁰Raymond G. Kuhlen and Beatrice Lee, "Personality Characteristics and Social Acceptability in Adolescence," Journal of Educational Psychology, 34: 327, September, 1943.

⁹¹J. R. Leevy, "Social Competence of High School Youth," School Review, 51: 343-347, 1943.

fluctuation, one concerning rural youth and the other urban youth, came to the same conclusions; that a greater stability in friendships increased with chronological age and no upswing in friendship vacillation occurred during onset or initial stages of adolescence.⁹²

There are a few studies which relate physical aspects of growth to social maturity. Gates⁹³ reported low but positive correlations between social and emotional maturity and height and weight in a group of young children. Jones and Bayley⁹⁴ found that adolescent boys who are physically accelerated are considered to be more mature socially. In the case of girls, the postmenarcheal girl was found to show greater maturity in interests and attitudes in a study by Stone and Barker⁹⁵ and in another study were judged by parents and teachers to be behaviorally more mature.⁹⁶

⁹²John E. Horrocks and George G. Thompson, "A Study of the Friendship Fluctuations in Rural Boys and Girls," Journal of Genetic Psychology, 69: 189-198, 1946; and "A Study of the Friendship Fluctuations of Urban Boys and Girls," Journal of Genetic Psychology, 70: 53-63, 1947.

⁹³A. I. Gates, "Nature and Educational Significance of Physical Status and of Mental, Physiological, Social and Emotional Maturity," Journal of Educational Psychology, 15: 329-358, 1924.

⁹⁴H. E. Jones and N. Bayley, "Physical Maturing Among Boys as Related to Behavior," Journal of Educational Psychology, 41: 129-48, 1950.

⁹⁵C. P. Stone and R. G. Barker, "Aspects of Personality and Intelligence in Postmenarcheal and Premenarcheal Girls of the Same Chronological Age," Journal of Genetic Psychology, 54: 27-71, 1939.

⁹⁶R. G. Barker, B. A. Wright and M. R. Gonick, "Adjustment to Physical Handicap and Illness," Social Science Research Council Bulletin, Number 55, 1946, p. 372.

Research into the relationship between developmental maturity and prestige of adolescent girls conducted by Faust on 731 girls enrolled in the sixth, seventh, eighth and ninth grades concluded that the level of development is not a single factor in determining a girl's status in the group, but it is an important part of a composite of factors in creating a girl's reputation during adolescence. A discrepancy between rate of developmental change and rate of change in prestige-lending evaluations during adolescence was noted and was interpreted in terms of the different meaning which early and late development have for girls at different times during adolescence. After the transition to junior high school, the more favorable reputation scores were ascribed to the physically accelerated girls.⁹⁷

Laytham has concluded that biological maturity has a significant influence on athletic leadership, but not on elective or appointive leadership at the 13-year and 14-year age levels of junior high school boys.⁹⁸

Emotional Maturity. In a study of problem pupils conducted by Tucker, the consistency in emotional development from childhood to adolescence was explored. He found that adolescents with

⁹⁷Margaret S. Faust, "Developmental Maturity as a Determinant in Prestige of Adolescent Girls," Child Development, 31: 173-184, 1960.

⁹⁸A. J. Laytham, "The Relationship Between Pubertal Status and Leadership in Junior High School Boys," The Journal of Genetic Psychology, 78: 183-194, 1961.

delinquent tendencies often have shown signs of emotional disturbance over a period of several years.⁹⁹ Neilon's study of 1948 appears to support this view.¹⁰⁰ Studies by Blatz and Bott and Haggerty disclosed a larger proportion of behavior problems in the thirteen and fourteen-year age groups, which was taken as an indication of a prepubertal peak of unruliness.¹⁰¹ However, Westley and Elkins' study produced results disputing the theory of Hall and others regarding adolescence as a period of upheaval when they reported that the middle-class child of the fourteen to fifteen-year age group did not experience a tension-filled adolescent period distinct from childhood and adulthood.¹⁰²

Situations in which there is a good emotional climate, where assistance is adequate, where individuals are relaxed,

⁹⁹Arthur J. Jersild, The Psychology of Adolescence, (New York: The Macmillan Company, 1957), p. 353.

¹⁰⁰P. Neilon, "Shirley's Babies," Journal of Genetic Psychology, 73: 175-186, 1948.

¹⁰¹W. E. Blatz and Helen M. Bott, "Studies in Mental Hygiene of Children, I. Behavior of Public School Children: A Description of Methods," Pedagogical Seminary, 34: 552-582, 1927; and M. E. Haggerty, "The Incidence of Undesirable Behavior in Public School Children," Journal of Educational Research, 12, 102-122, 1925.

¹⁰²William A. Westley and Frederick Elkins, "The Protective Environment and Adolescent Socialization," Social Forces, 35: 243-249, March, 1957.

and where basic emotional needs are met have been shown to be conducive to full individual adolescent development.¹⁰³

One of the notable areas of research has been into the relationship between physical development and emotional maturity. This is particularly significant during adolescence since physical development has such a direct bearing upon the adjustment of the individual.¹⁰⁴ Davidson and Gottlieb administered the Rorschach to 26 pre-and post-menarcheal girls and found trends in the direction of greater maturity, spontaneity, social sensitivity, better self-awareness, greater productivity, and better social and personal adjustment as characteristic of the post menarcheal group.¹⁰⁵ The differentiating Sonoma Check List items in Domino's study of menarche and personality characteristics of mentally deficient women are also suggestive of the above findings, with the early maturing group characterized as affectionate, chatterers, coherent, feminine, interesting, and likeable.¹⁰⁶ Mussen and Jones have

¹⁰³Anna P. Burrell, "Facilitating Learning Through Emphasis on Meeting Children's Basic Emotional Needs: An In-Service Training Problem," Journal of Educational Sociology, 24: 381-393, March, 1951.

¹⁰⁴Gates, op. cit.

¹⁰⁵Helen Davidson and Lucille Gottlieb, "The Emotional Maturity of Pre- and Post-Menarcheal Girls," The Journal of Genetic Psychology, 86: 261-266, 1955.

¹⁰⁶George Domino, "Relation of Early and Late Menarche to Personality Characteristics in Mentally Deficient Women," American Journal of Mental Deficiency, 71: 381-386, November, 1966.

interpreted their findings in studies of both early and late-maturing boys and girls to indicate that late-maturing adolescents of both sexes are characterized by less adequate self-concepts, slightly poorer parent-child relationships, and some tendency for stronger dependency needs.¹⁰⁷

Repeated studies have shown that the more emotionally disturbed an adolescent is, the less tolerant he is of his physical self. Many adolescents who are well within the normal range of development find that they cannot accept themselves for a variety of emotional reasons and project concern over themselves to some aspect of their appearance or achievement.¹⁰⁸ There is a fairly high correlation between difficulties in psychological and social adaptability and excessive interest in the body.¹⁰⁹ With reference to adolescent acceptance of his physical self, Schonfeld has written:

A common area of concern is whether their development is sexually appropriate. When the sexual development is atypical in comparison with the standards of the subculture to which the adolescent belongs,

¹⁰⁷Paul Mussen and Mary C. Jones, "Self-Conceptions, Motivations, and Interpersonal Attitudes of Late- and Early-Maturing Boys," Child Development, 28: 243-256, 1957; and Mary Jones and Paul Mussen, "Self-Conceptions, Motivations, and Interpersonal Attitudes of Early- and Late-Maturing Girls," Child Development, 29: 491-501, December, 1958.

¹⁰⁸William A. Schonfeld, "Adolescence: Inappropriate Sexual Development and Body Image," Journal of American Medical Women's Association, 22: 847-858, November, 1967.

¹⁰⁹F. J. Curran and J. Frosch, "The Body-Image in Adolescent Boys," Journal of Genetic Psychology, 60: 37-60, 1942.

whether it be stature, configuration, body and facial hair, absence of breasts or menarche in girls, or enlarged breasts or small penis in boys, there is a loss of self-esteem, often agonizing self-consciousness, and unwholesome adaptations because of a disturbance in body image.¹¹⁰

While the 1956 research by Gesell, Ilg, and Ames, Youth: The Years from Ten to Sixteen, does not draw conclusions, the differences in the emotional development of students at the different age levels, described in great detail in this study, and summarized below, do contribute much to the understanding of adolescent emotional make-up.¹¹¹

Thirteen Years Old:

Thirteen is described by parents as thoughtful, inwardized, quiet, self-contained. This may go to extremes, and then he is described as withdrawn, morbid, morose, moody, secretive, lethargic, indifferent, sullen, seclusive, "in a minor key." Extremely sensitive and vulnerable--easily hurt, irritated, or annoyed. In anger, wants to get off by himself, to his own room. Many cry on occasion. Humor is less frequent and leans on sarcasm, but is more amusing to adults (than twelve-year-olds).

Fourteen Years Old:

Fourteen is expansive and outgoing, energetic and enthusiastic. He is much less withdrawn, and appears much happier than at thirteen. Loves competition. Anger is less frequent, and is manifested verbally rather than physically or by withdrawal. Humor (other than parents') is much appreciated.

Fourteen actually may experience more inner confusion and turmoil than his independent, self-assured manner might indicate.

¹¹⁰Schonfeld, op. cit., p. 849.

¹¹¹Arnold Gesell, Francis L. Ilg, and Louise B. Ames, Youth: The Years from Ten to Sixteen (New York: Harper and Bros., 1956).

Fifteen Years Old:

Fifteen is described by parents as more self-confident, determined, subtle, discriminating, self-controlled than at fourteen. Behavior is much less outgoing, and many are moody, restless, dissatisfied, apathetic. Prefers to cover his feelings. May be muddled and confused. Mature enough to be aware of many problems, he has not yet worked through to solutions. Fifteen appears unhappy with himself and with others--yet his own reporting shows him as happier than he seems.

Sixteen Years Old:

Sixteen appears cheerful, friendly, positive, outgoing, well-adjusted, matter-of-fact, "even-keeled." He generally takes things easily, thinks things are going reasonably well, takes a calm approach even to problems, doesn't believe in worrying.

Some Sixteens are becoming quite analytical about their own emotions. Show considerable interest in whether they can control their emotions or are controlled by them. Anger is better in hand.

Humor can be used as a social technique. Self-evaluation is frequent: "I get impatient," "I'm a little moody."

Emotional and Social Maturity. The studies noted in this section have combined both emotional and social maturity traits in their results. Klausmeier reported in reviewing the conclusions of the 1952 longitudinal study by Schoeppe and Havighurst of thirty adolescents, that learning efficiency in the normal school subject-matter areas was found to be related to emotional behavior and social adjustment.¹¹² Tyler, in analyzing adjustment patterns of thirty boys in the California Growth Study by means of Kendall's

¹¹²Herbert J. Klausmeier, Learning and Human Abilities (New York: Harper and Brothers, 1961), p. 79.

W, determined significance for only half of the subjects, indicating that social and emotional adjustment were erratic during the adolescent period.¹¹³

The study of personality adjustment of junior high school students by Mason in 1949, using the Cowan Adjustment Analyzer to discover the relationship between personality adjustment and chronological maturation, disclosed that the peak of maladjustment for the eight areas studied occurred in the thirteen to thirteen and one-half year age group. The author concluded that, since the chronological period of the peak in pubescence comes at approximately the same age, "personality adjustment is adversely associated with or influenced by physical maturation."¹¹⁴

In recent years it has been common to find that girls tend to score higher than boys on various adjustment measures. As early as 1929, Wickman¹¹⁵ reported that teachers observed far more problems in boys' behavior than in girls'. Ullman¹¹⁶ in 1952,

¹¹³Frederick T. Tyler, "Stability of Intra-Individual Pattern-
ing of Measures of Adjustment During Adolescence," Journal of
Educational Psychology, 48: 217-226, April, 1957.

¹¹⁴Evelyn S. Mason, "A Study of Personality Adjustment of
Pupils in a Junior High School" (unpublished Doctoral dissertation,
Rutgers University, New Brunswick, New Jersey, 1949).

¹¹⁵E. K. Wickman, Childrens Behavior and Teachers'
Attitudes (New York: Commonwealth Fund, 1929).

¹¹⁶C. A. Ullman, Identification of Maladjusted School
Children (Washington, D. C: Public Health Monograph Number 7,
1952).

surveyed the research regarding sex differences in adjustment since Wickman. The studies he cited and the result of his own research consistently showed higher adjustment scores in girls. On the basis of his data Ullman concluded that there are important qualitative differences in patterns of adjustment for boys and girls. Powell's study in differences between the sexes in 1955 supported these findings. Results of his testing showed that conflicts appear at an earlier age for females than for males in eight different areas of adjustment. The greatest divergency was at age thirteen.¹¹⁷ Weinstein and Geisel's 1960 analysis of sex differences in adjustment compared mean scores on seven adjustment measures for adolescents of both sexes. The results conformed with those of the other research cited. Differences favored the girls in six of seven cases.¹¹⁸

Adolescent Intellectual Maturity

Only a few pertinent and representative studies from the immense body of literature concerning human mental growth and development were reviewed. Bayley's longitudinal studies of children from birth to age twenty-one disclosed rapid mental growth up until about the age of twelve, after which the mental growth rate began to decrease. Mental growth, however, was going on

¹¹⁷Marvin Powell, "Age and Sex Differences in Degree of Conflict Within Certain Areas of Psychological Adjustment," Psychological Monographs, Number 2, 69: 1-13, 1955.

¹¹⁸E. A. Weinstein and P. N. Geisel, "An Analysis of Sex Differences in Adjustment," Child Development, 31: 721-728, 1960.

at the last age reported.¹¹⁹ It has been shown that environment,¹²⁰ in addition to several other factors, can affect intellectual maturity. In mental as in physical growth there are wide variations among individuals.¹²¹ The relationship between certain personal characteristics and mental growth was studied at the Fels Research Institute, where it was concluded that rate of mental growth "did not appear to be related to any specific areas of ability as measured by the performance on the different types of items."¹²²

Piaget noted in his studies of the development of quantity conceptions in children that abstract responses to mass, weight, and volume appear in a regular sequence related to age.¹²³ A number of studies have confirmed in part the results obtained by Piaget. Elkind tested 469 junior and senior high school students for their conceptions of mass, weight, and volume. The results showed:

¹¹⁹Nancy Bayley, "Individual Patterns of Development," Child Development, 27: 45-74, 1956.

¹²⁰M. P. Honzig, "Developmental Studies of Parent-Child Resemblance in Intelligence," Child Development, 28: 215-228, 1957; and H. M. Skeels and I. Harms, "Children with Inferior Social History: Their Mental Development in Adoptive Homes," Journal of Genetic Psychology, 72: 283-294, 1948.

¹²¹Bayley, loc. cit.

¹²²Lester W. Sontag, Charles T. Baker and Virginia L. Nelson, "Mental Growth and Personality Development: A Longitudinal Study," Monographs of the Society for Research in Child Development, XXIII, Number 2, 1958.

¹²³Jean Piaget, The Child's Conception of Numbers (London: Kegan, Paul Trench and Company, 1952).

- (a) of the students tested, 87 per cent had attained abstract conceptions of mass and weight, but only 47 per cent had attained an abstract conception of volume;
- (b) the percentage of students having an abstract volume conception increased significantly between the ages of 12 to 18; (c) a significantly higher percentage of boys than girls attained an abstract conception of volume;
- (d) there was a low but positive correlation of IQ with attainment of the volume conception.¹²⁴

As shown in Table IV there was a regular increase with age in the percentage of students who had abstract volume conception. Table IV also shows that for each age level the percentage of boys was consistently higher than the percentage of girls who had an abstract conception of volume. The finding of a low but positive correlation of IQ with attainment of the volume conception is consistent with that of other studies.¹²⁵

Freeman and Flory tested large numbers of adolescents from 8 to 18 years of age with a battery of mental tests. Their analysis showed that, in general, adolescents tend to continue to develop at the same relative levels. The developmental picture of the majority of subjects fit into a regular developmental trend rather than a growth pattern characterized by periods of spurts and retardation.¹²⁶

¹²⁴David Elkind, "Quantity Conceptions in Junior and Senior High School Students," Child Development, 32: 551-560, 1961.

¹²⁵J. M. Deutsche, "The Development of Children's Concepts of Casual Relations," University of Minnesota Institute of Child Welfare Monographs: Number 13, 1937; and David Elkind, "The Development of Quantitative Thinking: A Systematic Replication of Piaget's Studies," Journal of Genetic Psychology, 98: 37-46, 1961.

¹²⁶F. N. Freeman and C. D. Flory, "Growth in Intellectual Ability as Measured by Repeated Tests," Monographs of the Society for Research in Child Development, Volume 2, Number 2, 1937.

TABLE IV

PERCENTAGE AND MEAN IQ OF STUDENTS, CLASSED BY SEX
AND AGE, HAVING ABSTRACT CONCEPTIONS OF QUANTITY¹²⁷

Sex	Grade	N	Mean Age	Mean IQ	Quantity Conception		
					Mass	Weight	Volume
M	7	56	12.6	94.6	79	71	38
F	7	66	12.6	99.2	79	86	26
M	8	46	13.6	89.6	78	74	43
F	8	48	13.6	100.9	90	92	29
M	9	28	14.6	99.6	93	96	68
F	9	45	14.6	107.9	93	93	40
M	10	31	15.5	95.3	97	90	58
F	10	41	15.7	101.9	98	93	39
M	11	29	16.4	100.0	83	90	72
F	11	43	16.6	107.9	86	86	58
M	12	14	17.7	109.9	100	100	79
F	12	12	17.7	108.3	100	95	68
TOTALS							
M		204	15.1	96.5	85	83	54
F		265	15.1	104.3	89	90	40
M & F		469	15.1	100.4	87	87	47

¹²⁷Elkind, op. cit., p. 554.

A study of adolescent critical thinking by Edwards showed that such thinking abilities may be taught after the essential knowledge and information has been acquired. Intellectual maturation is a logical determinant in this acquisition.¹²⁸ Studies of adolescents by Getzels and Jackson¹²⁹ and Torrance,¹³⁰ both largely outgrowths of Guilfords work on divergent thinking and creativity, indicated that creative abilities may be different from other mental abilities, although related. With advancement from childhood into and through adolescence there is an increased stability of patterns of mental abilities as shown in a study by Meyer who concluded, "These studies clearly demonstrate (a) increasing stability of test patterns with age and (b) increasing differentiation of the primary abilities with age."¹³¹

School Grade Organization and Maturity Factors

There have been several studies conducted within the past ten years which have concerned themselves with grade organization in the junior high school years in relation to the needs and abilities

¹²⁸T. B. Edwards, "Measurement of Some Aspects of Critical Thinking," Journal of Experimental Education, 18: 268, 1950.

¹²⁹J. W. Getzels and P. W. Jackson, "The Study of Giftedness: A Multi-dimensional Approach," The Gifted Student, Cooperative Research Monographs, Number 2, (Washington: Government Printing Office, 1960), pp. 1-18.

¹³⁰E. P. Torrance, Guiding Creative Talent (Englewood Cliffs, New Jersey: Prentice-Hall and Company, 1962).

¹³¹William J. Meyer, "The Stability of Patterns of Primary Mental Abilities Among Junior High and Senior High School Students," Educational and Psychological Measurements, 20: 795-800, 1960.

of the adolescent who must actually attend the school. These studies have, no doubt, been precipitated by the middle school movement. In Sanders' study to determine whether there was greater homogeneity within a student body composed of grade six through eight or one composed of grades seven through nine with respect to mental and educational development, differences between standard deviations of at least five per cent on the seven measures of intelligence and achievement used were demanded as evidence of educational significance. It was concluded that grades six through eight did not constitute a more heterogeneous group than seven through nine as was hypothesized. Most differences which did exist were too small to be educationally significant.¹³²

Spagnoli's study of adolescent needs and the junior high school found that some authorities note a trend toward realignment of grades which they believe will enhance the learning and social atmosphere of the early adolescent. However, there appears to be insufficient evidence to support the belief that youth can be better accommodated in one type of grade organization over another. There does appear to be agreement, however, that a minimum cycle of three consecutive years is superior to a two-year intermediate school program.¹³³

¹³²Stanley G. Sanders, "Differences in Mental and Educational Development from Grades Six Through Nine and Implications for Junior High School Organization" (unpublished Doctoral dissertation, University of Iowa, Iowa City, 1966).

¹³³Joseph Spagnoli, "Today's Early Adolescent and the Needs of Youth as Identified Through the Junior High School," Dissertation Abstracts, 28: 3574A, January-March, 1968.

Dacus, in 1963, studied the age-grade maturity levels of fifth through tenth grade students as indicated by the four selected maturational trait areas of social, emotional, and physical maturity and opposite sex choices in an effort to ascertain the most desirable grade organization combinations. His population was a single school district in Texas. Approximately 55 students in grades five through ten were selected randomly from the population for actual testing. Limitations on the population were such that only students with intelligence quotients between 90 and 110, and those in normal progress were considered. Males and females of the sample selected were studied separately, in addition to the combined sample, thus providing three samples for the study.

Social and emotional maturity were measured by the California Test of Personality. Data on the age at onset of puberty, menarche for females and pubic hair for males, was used as a discrete measure of physical maturity. A simple sociometric device supplied measures for the opposite-sex choice trait area.

The six grades were split into two divisions, a lower division consisting of grades five, six and seven and an upper division made up of grades eight, nine and ten. A "t" test of the differences between means for the various groups was the statistical analysis used for the social and emotional maturity variables and a chi square statistic had to be used for analyzing the physical maturity and opposite-sex choice data since it was reported in discrete terms. Each division was analyzed separately in an effort to discover which of the two possible grade combinations had the least

amount of difference according to the four maturity factor areas. The least number of significant differences was taken as the index to facilitate the choice of one combination over another. This procedure was followed for all three samples.

Analyses of the data disclosed for the lower division, six significant differences out of a possible twelve for grades five and six, whereas grades six and seven registered only one significant difference. For the upper division, eight significant differences out of twelve were produced in the grade eight and nine couplet, as compared to four significant differences for the ninth and tenth grade combination. The researcher concluded that a grade or-
ganizational pattern which would allow for grades six and seven to be combined along with a ninth and tenth grade combination was suggested in terms of the maturity factors.¹³⁴

A longitudinal research study to investigate individual and group changes in a group of seventh, eighth and ninth grade adolescents was conducted by Hays in 1964. One purpose of the study was to relate the developmental changes that occurred among students in the study to recommended programs for junior high school education. The participants in the study were a selected group attending a junior high laboratory school at Indiana State College, Indiana, Pennsylvania.

¹³⁴Wilfred P. Dacus, "A Study of the Grade Organizational Structure of the Junior High School as Measured by Social Maturity, Emotional Maturity, Physical Maturity, and Opposite-Sex Choices" (unpublished Doctoral dissertation, University of Houston, Houston, Texas, 1963).

Among the measurements obtained over a three-year period were those in the areas of 1) mental maturity, 2) personal-social adjustment, and 3) social behavior preferences. Measurement data was obtained by using standardized tests published by the California Test Bureau. Some findings related to this review include the following:

1. Changes in attitudes and interests among the twelve to fourteen-year age group suggested that more exploratory experiences are necessary to help meet the emerging social and emotional needs of that group.
2. Fluctuation in mental maturity test scores showed that single I. Q. scores from group intelligence tests are questionable predictors of ability.
3. Personal and social development is generally consistent during early adolescence.¹³⁵

Austin compared the achievement and adjustment of adolescent pupils attending both the 5-3-4 and the 6-3-3 organizational patterns. Using recognized standardized achievement tests he determined that there were no conclusive differences in the seventh grade sample, but very significant differences occurred in the ninth grade. This finding gave rise to serious questions of sampling error. The adjustment portion of the study disclosed that no

¹³⁵ John J. Hays, "A Longitudinal Study of the Intellectual, Personal-Social, Physical and Occupational Interest Development of a Selected Group of Early Adolescents During Grades Seven, Eight and Nine," Dissertation Abstracts, 26: 2587, November-December, 1965.

significant differences in drop-out rates occurred, but that parents overwhelmingly favored the 5-3-4 pattern.¹³⁶

The foregoing studies cited in this section are of value principally because they represent the few studies which have actually empirically measured some aspect of adolescence. The two concluding studies of this review, which follow, are based on extensive reviews of the literature for their conclusions and for that reason are of value.

A socio-psychological model was developed by Eichhorn to conceptualize a functional nongraded middle school. Based on a review of research evidence found in the literature of psychology, sociology, education and educational administration, the hypothesis that students possess varying personal characteristics and educational needs which suggest a restructuring of the present educational organization to include a middle school composed of students presently found in grades six, seven, and eight was substantiated. Eichhorn concluded, "...the same phenomenon of earlier physical maturation and social interest patterns suggested the inadvisability of placing most present seventh and eighth grade students with ninth grade students."¹³⁷ Another study, based on

¹³⁶John C. Austin, "A Comparative Study of Two Forms of School Organization for the Early Adolescent in Terms of Pupil Achievement and School Adjustment," Dissertation Abstracts, 28: 4814A, June, 1968.

¹³⁷Donald G. Eichhorn, "Nongraded Middle School-- Supporting Theory and Conceptualized Functional Model," Dissertation Abstracts, 27: 627A, July-September, 1966.

a review of the literature in addition to solicitation of opinions of school administrators and interviews with them, was done by Hench in 1967. One of the purposes of the study was to evaluate the weaknesses and failures of the junior high school, with particular attention given to those growing out of its grade organization. The placement of the ninth grade constituted the central theme of the study. The author stated:

The findings of this study conclusively show that the ninth grade should be placed with the tenth grade in either a two-year (9-10) intermediate high school or in a four-year (9-12) senior high school.¹³⁸

Summary of Related Literature

The inception of the junior high school movement and early surveys of school organizational patterns were briefly reviewed. More recent opinionnaire-questionnaire and inquiry type studies indicated preference for a separate grade organization for adolescents. Literature from 1908 to 1969, dealing with adolescent physical maturity was surveyed. Evidence of a trend toward earlier adolescence over the past century was summarized, and the most recent statistical data was presented, including that for both the primary and secondary sex characteristics. Research dealing with social and emotional maturity was examined. It was pointed out that most research in this area has been based largely

¹³⁸Harold E. Hench, "A Review of the Growth and Development of the Junior High School with Proposals for Modifications Based Upon Studies of Selected Pennsylvania School Districts" (unpublished Doctoral dissertation, Ohio University, Athens, Ohio, 1967), p. 107.

upon the middle-class, white, American population. Relationships between social and emotional maturity and physical maturity were also examined. Mental growth, conceptual development and research into Piaget's theories of adolescent mental maturation were reviewed. Studies of adolescent critical and/or divergent thinking patterns were discussed. The review of investigations conducted into the relation between school grade organization and various adolescent maturity factors indicated concern by researchers and school administration authorities about the relationships between pupils of widely different maturational levels within the same school organizational unit and evidence of an earlier maturity and entrance into adolescence by youth. There was also some evidence that a school grade organizational plan different from the traditional 7-8-9 junior high school for adolescents would be appropriate in terms of maturity differences.

CHAPTER III

RESEARCH PROCEDURES

Sample Selection and Variable Control

The Sample. The students in the sample of 300 subjects were randomly drawn from a previously randomly selected sample of 390 students chosen from the study population of two suburban St. Louis County, Missouri, school districts. The population school districts were organized on the 6-3-3 plan. The eighth and ninth grade students in the sample were randomly selected from five junior high schools and the tenth grade students in the sample were randomly selected from three senior high schools.

Variable Controls. Only students in normal progress were considered for measurement. That is, eighth grade students had a chronological age of 13 or 14, ninth grade students 14 or 15, and tenth grade students 15 or 16.

It was conceded that the maturity level of the students' associates, the type of instructional background of the students, the different abilities of teachers, the kind of supervision under which the child was reared, and the socio-economic background of the students would, to some degree, affect the findings of the research. Due to the substantial similarities among the suburban school districts chosen as the study population these effects were minimized.

The possible effects on the sample data of students who had recently transferred into the population schools and the effect that actually being housed in a senior high school building would have had on the intellectual, emotional and social maturity levels of the tenth grade students in the sample were recognized. These possible effects were controlled as follows: the random selection procedure to identify individual students in the sample was conducted using the 1968-69 school year class rolls for the seventh, eighth and ninth grades in the five junior high schools. Prior to the initiation of the measurement procedures, the students in the sample were promoted by their schools to the eighth, ninth and tenth grades, respectively. In this way, when the measurement of the four criterion maturity variables was accomplished early in the 1969-70 school year, the possible effects on the data by the tenth grade students in the sample physically being in the senior high school building was minimal and the transfer student effect was completely eliminated.

The random selection of the students in the sample from the population school district's junior and senior high schools was assumed to remove the effects of all otherwise uncontrolled variables. The possible influence of extremely high or low intelligence on the sample data was a recognized example of these variables.

Sample Mortality. It was recognized that some sample mortality might occur because of such factors as student drop-outs

and families moving away during the time interval between identification of the students in the sample and the beginning of measurement procedures. Therefore, thirteen students of each sex were chosen at random from the 1968-69 school year class lists of each seventh, eighth and ninth grade. This procedure was followed for each of the five junior high schools. A total of 390 students were chosen by name. When the data collection phase of the investigation was completed in the early fall of the 1969-70 school year, the students in the sample had been promoted to the eighth, ninth and tenth grades, respectively. Of the 390 students originally chosen, 347 were available for measurement on the four study maturity variables.

Through further use of random selection procedures the study sample of 300 students was chosen from the 347 who were measured. Ten students of each sex from each of the eighth and ninth grades were randomly selected for the study sample. Since four of the junior high schools in the population promoted graduates to two of the three senior high schools, twenty tenth grade students of each sex were randomly selected from each of those two senior high schools for the study sample. Ten tenth grade students of each sex were chosen for the study sample from the third senior high school. Hence, the study sample of 300 students, whose maturity test scores were analyzed statistically, consisted of 50 students of each sex from each of the eighth, ninth and tenth grades of the population schools.

Data Gathering Techniques

Measuring Physical Maturity. Ideally, the measurement of physical maturity should have been accomplished by a medically trained individual or a panel of medical experts. Further consideration of this ideal, however, was abandoned when it became apparent that administrative efficiency and practicality could not be maintained. The major considerations which appeared to be insurmountable were (1) limited availability of medical doctors over the time period and in the numbers necessary for the evaluation; (2) reluctance of pediatricians to deal with youngsters over twelve years of age; (3) probable difficulty in obtaining parent's permission for a physical examination; (4) complex logistics involved in actually attempting to conduct the physical examinations; (5) possible introduction of additional bias into the sample by parent non-cooperation and (6) probable additional sample mortality brought about by inconvenience, parental doubts and personal reluctance or timidity by individual subjects. As a consequence, an alternate measuring method was adopted.

At the suggestion of Dr. Fernando Tapia, Director of Children's Service, Mid-Missouri Mental Health Center, and Professor of Psychiatry, University of Missouri Medical Center, Columbia, Missouri, a scheme for rating puberty along a series of maturity continua was devised.¹³⁹ This rating system, which was used as the measure of physical maturity, was based on an

¹³⁹Fernando Tapia, personal interview, December 2, 1968.

amalgam of the factors previously identified by several prominent adolescent psychologists and researchers as being indicative of pubescence.¹⁴⁰ The aforementioned researchers have used the puberty rating system components both singularly and in combination in prior research.

The rating instrument consisted of a series of four criterion variables for each sex, upon which the rater rated each subject. Each of the four criteria represented a particular component of physical development along the continuum toward maturity. The criterion variables considered in evaluating the degree of pubescence in males were (1) the development of pubic hair; (2) the development of axillary hair; (3) development of facial hair; and (4) development of the genitalia. For females, the criteria were (1) the development of pubic hair, (2) the development of axillary hair; (3) breast development; and (4) menarcheal experience. Each subject had four measures of physical maturity, with each measure based on a different criterion variable.

Each subject was rated on the series of four appropriate criterion variables by the subject's own physical education teacher.

¹⁴⁰A. Hughes Bryan, "Methods for Analyzing and Interpreting Physical Measurements of Groups of Children," American Journal of Public Health, 44: 766-771, 1954; Dimock, op. cit., p. 209; R. W. B. Ellis, "Age of Puberty in the Tropics," British Medical Journal, 1: 85-96, 1950; Schonfeld, loc. cit.; William A. Schonfeld and G. W. Beebe, "Normal Growth and Variation in the Male Genitalia from Birth to Maturity," Journal of Urology, 48: 759-777, 1942; and Reynolds and Wines, loc. cit.

Since all schools in the population had male physical education teachers for boys and female teachers for girls, the choice of raters was justified on the bases of (1) professional training; (2) competence to render a valid and reliable evaluation on the criteria; (3) frequent observational opportunities; (4) lack of a logical basis for bias; and (5) ease of administration of the rating system.

Precedence for this method of physical maturity assessment was found in Faust's study of developmental maturity in girls. Faust explained, "The data were obtained at a time when the girls were in a health class or physical education class separate from the boys, and when it would seem very natural for the staff to obtain such developmental data."¹⁴¹ This observation plan was utilized for both boys and girls in this investigation.

Each component of the Puberty Rating Scale series was assumed to be an element of an individual subject's physical maturity. The intercorrelations between the observed component variables were then calculated and compared to the calculated reliabilities of the individual component observations. Since the intercorrelations exceeded the maximum chance value for two variables with 49 degrees of freedom and the reliability values for each component were acceptably high, the four component measures for each individual were combined to obtain a single

¹⁴¹Faust, op. cit., p. 175.

physical maturity score with increased reliability.¹⁴² This single score was then used as the subject's physical maturity score.

Measuring Intellectual Maturity. The Otis Quick Scoring Mental Ability Test, New Edition, was the instrument used to obtain data on mental age (mental maturity). Mental measurements of junior high school adolescents through use of this instrument were recently included in a research study of non-intellectual factors between academically bright male high and low achievers reported by O'Shea.¹⁴³ In addition to adequate reliability, this instrument had the advantage of a thirty-minute administration time. The Beta test was used to measure all subjects.

Alfred Yates, Senior Research Officer of National Foundation for Educational Research, London, England, reported a reliability coefficient of .91 and a standard error of 4.0 for the Beta test.¹⁴⁴ He says, "The purpose of the test is to measure mental ability defined as 'thinking power or the degree of maturity of the mind'."¹⁴⁵

¹⁴²F. W. Ohnmacht, "A Note on Indices of Creativity," Perceptual and Motor Skills, 22: 370, 1966.

¹⁴³Arthur J. O'Shea, "Differences in Certain Non-Intellectual Factors Between Academically Bright Junior High School Male High and Low Achievers," Dissertation Abstracts, 28: 3515-A, January-March, 1968.

¹⁴⁴O. K. Buros (ed.), Fifth Mental Measurements Yearbook (New Brunswick, N. J: Rutgers University Press, 1959), p. 500.

¹⁴⁵Ibid.

Substantiation of these reliability coefficients was given by Dr. D. W. Lefever, Professor of Education, University of Southern California, who added, "These data seem to indicate a satisfactory level of reliability."¹⁴⁶

Measuring Emotional and Social Maturity. The California Test of Personality was used to procure data on emotional and social maturity. The instrument was designed to measure all grades from kindergarten to adult, but only from AA Intermediate (grades 7-10) was used for this study.

Previous use of the California Test of Personality to measure adolescent social and emotional maturity was made by Weinstein and Geisel¹⁴⁷ in their analysis of sex differences in adjustment and Dacus¹⁴⁸ in his study of junior high school grade organization and adolescent maturity.

The test consisted of two parts: personal adjustment, which was used as the measure of emotional maturity and social adjustment, which was used as the measure of social maturity. Under personal adjustment (emotional maturity) the following components were listed: self-reliance; sense of personal worth; sense of freedom; feeling of belonging; withdrawing tendencies; and nervous symptoms. Under social adjustment (social maturity) the following

¹⁴⁶Ibid., p. 498.

¹⁴⁷Weinstein and Geisel, op. cit., p. 722.

¹⁴⁸Dacus, op. cit., p. 6.

components were listed: social standards; social skills; antisocial tendencies; family relations; and community relations.

Reliability coefficients, according to the Kuder-Richardson formula were as follows: personal adjustment .93; social adjustment .94; total adjustment .96. The corresponding standard errors of measurement were respectively, 3.57, 3.43 and 5.10.¹⁴⁹ It was noted that the reliability coefficients of the components were relatively low (ranging from .70 to .97) when compared to the reliability coefficients of tests designed to measure knowledge, understanding and skills. The test authors' justification was:

Some of the items in this test touch relatively sensitive personal and social areas, and such student attitudes may change in a relatively short time. For these and other reasons, the statistical reliability of instruments of this type will sometimes appear to be somewhat lower than that of good tests of ability and achievement.¹⁵⁰

Data Collection Administration. All the students in the sample were tested or rated in their own schools. The Puberty Rating Scale was completed by the appropriate physical education teacher, and the California Test of Personality and the Otis Quick Scoring Mental Ability Test, New Edition, were administered by either the investigator or the school counselor. The students tested were given only a minimum of explanatory information. Machine scored answer sheets were used for both tests. Answer sheets were

¹⁴⁹Thorpe, Clark and Tiegs, op. cit., p. 4.

¹⁵⁰Ibid.

scored on Digitek¹⁵¹ equipment by the Missouri State-Wide Testing Service staff. Puberty Rating Scale results were tabulated by the investigator.

Upon completion of scoring and tabulation, the data were key punched into data processing cards for computer use.

Statistical Design

Statistical Procedure. The first statistical procedure to be employed upon the completion of data collection was to correlate the seven maturity variable measures, i. e., four for physical maturity and one each for intellectual, emotional and social maturity, to ascertain if all of the variables measured were indicative of one general adolescent maturity factor. A computer library program for the Pearson product-moment coefficient of correlation based upon the following formula was executed for this purpose:¹⁵²

$$r = \frac{N\sum XY - \sum X(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

Secondly, confirmation of the reliability assumptions previously made relative to combining the four criterion variable measures of physical maturity for each sex was made. Computer programs were used for calculating the individual variable reliabilities and the correlations of each set of four variables. The

¹⁵¹Digitek 100 Optical Scanner.

¹⁵²Henry E. Garrett, Statistics in Psychology and Education (New York: Longmans, Green and Company, 1958), pp. 53, 143, and 332.

program for calculating reliability utilized the Kuder-Richardson Formula 20 method using Ferguson's formula:¹⁵³

$$r = \frac{n}{(n-1)} \cdot \frac{S_x^2 - \sum pq}{S_x^2}$$

For correlations, the computer library program for the Pearson product-moment coefficient of correlation was used.¹⁵⁴ After calculating the individual variable reliabilities and intercorrelations for each set of variables, it was ascertained that the correlations of the sets of maturity variable measures approached the reliabilities of the individual variability measures to the degree necessary to justify their combination.¹⁵⁵ The four measures for each sex, then, were combined to increase the reliability with which physical maturity was measured. Each subject then had one composite physical maturity score.

Correlations, utilizing the computer library program for the Pearson product-moment coefficient¹⁵⁶ were then computed for the four maturity variable measures, using the composite physical maturity values as the measure of physical maturity. These calculations served to check on the accuracy of the previous correlations of the seven original variable measures.

¹⁵³George A. Ferguson, Statistical Analysis in Psychology and Education (New York: McGraw-Hill Book Company, 1966), pp. 377-380.

¹⁵⁴Garrett, loc. cit.

¹⁵⁵Ohnmacht, loc. cit.

¹⁵⁶Garrett, loc. cit.

The initial technique of data analysis used to answer the research questions consisted of a series of four two-way analysis of variance type designs as explained by Guilford.¹⁵⁷ Each two-way analysis of variance (sex by grade level) was designed to disclose the source of variance for the particular maturity criterion variable under consideration. For both sexes the physical maturity components were analyzed with one-way analyses of variance to identify the source of the variance. Calculations of both one- and two-way analyses of variance were done utilizing computer library programs based on Guilford's formulas.¹⁵⁸ "F" test values for significant variation were required to meet .05 level of confidence values to be considered significant.

To answer questions of whether mean scores on the criterion variables for ninth grade students differed significantly from those of eighth and tenth grade students, it was necessary to use a statistical test for differences among several means. The test selected was the method developed by J. W. Tukey for the a priori multiple comparison of means.¹⁵⁹ Of this technique, Ryan, a recognized statistical authority, has written:

The allowance for simple differences (among means) obtained by the Scheffe method are larger

¹⁵⁷J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill Book Company, 1965), pp. 280-293.

¹⁵⁸Ibid.

¹⁵⁹J. W. Tukey, "Comparing Individual Means in the Analysis of Variance," Biometrics, 5: 99-114, 1949.

than those obtained from Tukey's method based upon ranges. For the ordinary multiple comparison problem, Tukey's method is therefore more powerful or more sensitive...¹⁶⁰

Bowker and Lieberman's discussion of Tukey's contrasts¹⁶¹ provided the basis upon which the computer library programs used for these calculations were formulated.

Computer Utilization. The data collected for analysis was punched into computer input cards for processing through the International Business Machines Corporation 360-65 computer in the University of Missouri Computer Center. Computation of the one- and two-way analysis of variance values and of the Tukey contrasts of means was accomplished through the utilization of appropriate computer library programs retrieved from the Computer Center of the University of Missouri.

Summary

Research procedure of this investigation consisted of measuring a randomized sample of eighth, ninth and tenth grade boys and girls on four maturity variables. The variables under consideration were physical, intellectual, emotional and social maturity. Only eighth, ninth and tenth grade students in normal progress from two suburban St. Louis County, Missouri, school districts were included in the sample. The physical maturity

¹⁶⁰Thomas A. Ryan, "Multiple Comparisons in Psychological Research," Psychological Bulletin, 56: 26-47, 1959, pp. 43-44.

¹⁶¹A. H. Bowker and G. J. Lieberman, Engineering Statistics (Englewood Cliffs, N. J: Prentice-Hall, Inc., 1959), pp. 294-299, 323-324.

variable was measured by means of physical education teacher ratings using the Puberty Rating Scale. The California Test of Personality was used to measure both the emotional and social maturity variables. Data on intellectual maturity was acquired through administration of the Otis Quick Scoring Mental Ability Test, New Edition. The statistical tests utilized to verify the validity of the Puberty Rating Scale components were the Kuder-Richardson and Pearson r. Statistical comparisons of maturity variables employed one- and two-way analysis of variance, the "F" test for significance, and the Tukey contrasts technique for multiple comparison of means.

CHAPTER IV

ANALYSIS OF THE DATA

If adolescent students in grades eight, nine and ten actually do differ significantly from each other with reference to physical, intellectual, emotional and social maturity attributes to the extent that a reorganization of the traditional school grade organization would be in order, then such differences should be substantiated by empirical evidence. The analyses of the data, as detailed in this chapter, produced correlations between measures, the significant F ratios in the analysis of variance, and differences in group means.

The questions asked of the data were:

1. To what extent, if any, is each of the four maturational elements of physical, intellectual, emotional and social maturity a significant factor in eighth, ninth, and tenth grade student differences when sex differences are controlled?
2. To what extent do significant differences exist between students, as differentiated by sex, with respect to physical, intellectual, emotional and social maturity?
3. Are ninth grade students significantly different from eighth grade students on any or all of the variables of physical, intellectual, emotional and social maturity?
4. Are ninth grade students significantly different from tenth grade students on any or all of the variables of physical, intellectual, emotional and social maturity?

The questions of the extent to which each of the four maturational elements is significant in student grade level and sex differences were answered by four two-way analyses of variance to test the significance of the differences among the

three grade levels and between the sexes simultaneously for each variable.

Analysis of Maturity Variables and Grade Differences

Statistical Validation of the Puberty Rating Scale. Initially, seven maturity criterion variables for adolescent students were measured. The female observations concerned the development of pubic hair, axillary hair, breasts, and the extent of menarcheal experience which were the physical maturity criteria. For the male sample, physical maturity criteria were pubic, axillary, and facial hair development, in addition to genital growth progress. Intercorrelations were computed between the physical maturity observations and the maturity variables of intellectual, emotional and social development for each grade and sex. The correlation coefficients calculated for Pearson's r are shown in Tables V and VI. The corresponding means and standard deviations are recorded in Appendix A.

The data depicted in Tables V and VI indicated a positive relationship between the four factors comprising physical maturity for each sex. Very low positive to low negative correlations were found between the physical maturity factors and the measures of intellectual, emotional and social maturity. A low positive correlation between intellectual maturity and both emotional and social maturity was constant and ranged from .399 for tenth grade girls (emotional and intellectual) to .152 for eighth grade girls (social and intellectual). Correlations between emotional and social maturity were consistently high and positive. This was possibly due

TABLE V

CORRELATIONS OF OBSERVED PHYSICAL MATURITY VARIABLES AND MEASURED
INTELLECTUAL, EMOTIONAL AND SOCIAL MATURITY VARIABLES FOR
EIGHTH, NINTH AND TENTH GRADE MALES

Grade Level	Variables	Social Maturity	Emotional Maturity	Intellectual Maturity	Genital Growth	Facial Hair	Axillary Hair	Pubic Hair
8	Pubic Hair	.157	.139	.190	.933	.526	.737	
	Axillary Hair	.131	.047	.149	.708	.563		
	Facial Hair	.267	.298	.298	.528			
	Genital Growth	.186	.134	.128				
	Intellectual Maturity	.345	.386					
	Emotional Maturity	.752						
9	Pubic Hair	-.206	-.073	.140	.891	.702	.724	
	Axillary Hair	-.140	-.013	.179	.714	.788		
	Facial Hair	-.078	.009	.001	.731			
	Genital Growth	-.130	-.018	.108				
	Intellectual Maturity	.372	.398					
	Emotional Maturity	.839						
10	Pubic Hair	-.124	-.136	-.026	.406	.325	.382	
	Axillary Hair	-.133	-.020	.231	.536	.666		
	Facial Hair	-.125	-.105	.035	.652			
	Genital Growth	-.075	.022	.295				
	Intellectual Maturity	.294	.369					
	Emotional Maturity	.608						

TABLE VI

CORRELATIONS OF OBSERVED PHYSICAL MATURITY VARIABLES AND MEASURED
INTELLECTUAL, EMOTIONAL AND SOCIAL MATURITY VARIABLES FOR
EIGHTH, NINTH AND TENTH GRADE FEMALES

Grade Level	Variables	Social Maturity	Emotional Maturity	Intellectual Maturity	Menarcheal Experience	Breast Develop.	Axillary Hair	Pubic Hair
8	Pubic Hair	-.092	-.040	.180	.540	.828	.916	
	Axillary Hair	-.177	-.041	.101	.601	.780		
	Breast Development	-.071	-.016	.157	.397			
	Menarcheal Exp.	-.185	-.022	-.056				
	Intellectual Maturity	.152	.285					
	Emotional Maturity	.738						
9	Pubic Hair	-.116	.026	-.024	.446	.601	.820	
	Axillary Hair	-.001	.080	-.039	.429	.513		
	Breast Development	.326	.239	-.080	.386			
	Menarcheal Exp.	.247	.145	.214				
	Intellectual Maturity	.313	.212					
	Emotional Maturity	.580						
10	Pubic Hair	.167	.164	-.031	.525	.717	.796	
	Axillary Hair	.115	.175	-.013	.411	.569		
	Breast Development	.046	.043	-.014	.467			
	Menarcheal Exp.	-.049	-.100	-.044				
	Intellectual Maturity	.366	.399					
	Emotional Maturity	.864						

to the fact that both measures were taken from the California Test of Personality. These data, because of the wide range of r values and inconsistencies, tend to confirm views of authorities on adolescent psychology¹⁶² that the elements of adolescent maturity, though interrelated, are separate aspects of a multi-faceted maturational process.

Verification of the statistical reliability of the Puberty Rating Scale required a comparison of the correlation coefficients between the observed physical maturity indices and their reliability coefficients.¹⁶³ Reliability coefficients for the physical maturity components were calculated by Kuder-Richardson Formula 20 Method. The calculated reliability coefficients are given in Table VII. The intercorrelations among the four physical maturity

TABLE VII

KUDER-RICHARDSON RELIABILITY COEFFICIENTS OF PUBERTY RATING SCALE COMPONENTS BY SEX AND GRADE LEVEL

Male		Female	
Grade Level	r	Grade Level	r
8	.992	8	.999
9	.995	9	.999
10	.988	10	.998

¹⁶²Arthur J. Jersild, The Psychology of Adolescence (New York: The Macmillan Company, 1966) and Karl Garrison, Psychology of Adolescence (Englewood Cliffs, N. J: Prentice-Hall, Inc., 1965).

¹⁶³Ohnmacht, loc. cit.

components were positive as shown in Table VIII. They ranged from .325 for facial and pubic hair for tenth grade boys to .933 for pubic hair and genital growth for eighth grade boys.

Arkin and Colton's¹⁶⁴ Table of 5% and 1% Points for r and R yielded .273 as the maximum value that might arise due to chance for two variables with 49 degrees of freedom. Since the low intercorrelation of .325 exceeded the maximum chance value of .273 and the Kuder-Richardson reliabilities were extremely high (Table VII, page 80), the requirements necessary to satisfy the assumption, that the four indices of physical maturity for each sex measured essentially a single common physical maturity factor, were met.¹⁶⁵ Therefore, the four physical maturity components were combined and the resultant physical maturity score with maximized reliability was used as the measure of physical maturity.

Pearson Product-Moment coefficients among the maturity variables using the composite physical maturity index are given in Table IX. The wide range of r values tends to confirm the contention that no single, general adolescent maturity variable was measured.

Physical Maturity. The variation found for grade levels with reference to the physical maturity factor as measured by the

¹⁶⁴Herbert Arkin and Raymond R. Colton, Tables for Statisticians (New York: Barnes and Noble, Inc., 1966), p. 155.

¹⁶⁵Ohnmacht, loc. cit.

TABLE VIII

INTERCORRELATIONS OF OBSERVED PHYSICAL MATURITY COMPONENTS FOR THE
EIGHTH, NINTH AND TENTH GRADE LEVELS AND SEXES

		Components	Pubic Hair	Axillary Hair	Facial Hair	Genital Growth	Breast Development	Menarcheal Experience
Male	8	Pubic Hair		0.737	0.526	0.933		
		Axillary Hair			0.563	0.708		
		Facial Hair				0.528		
		Genital Develop.						
	9	Pubic Hair		0.724	0.702	0.891		
		Axillary Hair			0.789	0.714		
		Facial Hair				0.731		
		Genital Develop.						
	10	Pubic Hair		0.382	0.325	0.406		
		Axillary Hair			0.666	0.532		
		Facial Hair				0.652		
		Genital Develop.						
Female	8	Pubic Hair		0.916			0.828	0.540
		Axillary Hair					0.779	0.601
		Breast Develop.						0.397
		Menarcheal Exp.						
	9	Pubic Hair		0.820			0.601	0.446
		Axillary Hair					0.513	0.429
		Breast Develop.						0.386
		Menarcheal Exp.						
	10	Pubic Hair		0.796			0.717	0.525
		Axillary Hair					0.569	0.411
		Breast Develop.						0.467
		Menarcheal Exp.						

TABLE IX

COEFFICIENTS OF CORRELATION FOR PHYSICAL, INTELLECTUAL, EMOTIONAL AND SOCIAL MATURITY FACTORS USING THE COMPOSITE PHYSICAL MATURITY MEASURE FOR EIGHTH, NINTH AND TENTH GRADE STUDENTS

		Males				Females			
Variable		Physical	Intellectual	Emotional	Social	Physical	Intellectual	Emotional	Social
Grade 8	Physical		.214	.169	.208		.103	-.034	-.154
	Intellectual			.386	.345			.285	.152
	Emotional				.752				.738
	Social								
Grade 9	Physical		.118	-.026	-.153		.024	.148	.135
	Intellectual			.398	.372			.212	.313
	Emotional				.839				.580
	Social								
Grade 10	Physical		.155	-.082	-.147		-.029	.093	.088
	Intellectual			.369	.294			.399	.366
	Emotional				.608				.864
	Social								

Puberty Rating Scale are shown in Table X. The variance as measured by the "F" test was found to exceed both the .01 and .05 level of confidence and the null hypothesis was not supported by the data.

TABLE X

ANALYSIS OF VARIANCE OF THE PHYSICAL MATURITY
VARIABLE FOR EIGHTH, NINTH AND TENTH GRADE STUDENTS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Grade Level	2	460.398	230.199	23.807**	3.03
Sex	1	508.297	508.297	52.569**	3.88
Interaction	2	75.305	37.652	3.894*	3.03
Within Sets	294	2842.701	9.669		
Total	299	3886.701			

*Significant at .05 level of confidence

**Significant at .01 level of confidence

Tukey's contrast for multiple comparison of means, an a priori comparison, yielded significant differences among all three means. The mean for the eighth grade was significantly lower than those of the ninth or tenth grades and the mean for the ninth grade was significantly greater than the mean for the tenth grade. Mean and standard deviation data for each grade's physical maturity is given in Table XI and for each sex by grade level in Appendix B.

Since the placement of the mean for the tenth grade between those of the eighth and ninth grades (Table XI) was not anticipated, and logically so, possible reasons for this peculiar situation were

sought. One-way analyses of variance were calculated for each of the original physical maturity components for each sex and a Tukey's a priori comparison of means was calculated where "F" tests were significant. Appendix C contains the results of these analyses of variance.

TABLE XI
PHYSICAL MATURITY MEANS AND STANDARD DEVIATIONS
FOR THE EIGHTH, NINTH AND TENTH GRADE LEVELS

Grade Level	Mean	Standard Deviation
8	10.470	3.700
9	13.465	3.464
10	12.390	2.928

The "F" tests were significant at both the .05 and .01 levels of confidence for the female physical components - pubic hair, axillary hair and breast development. The menarcheal experience component was significant at .05 level of confidence. Tukey's contrasts disclosed the following facts:

- (a) Pubic hair - mean for the eighth grade was significantly lower than the mean for the ninth grade but not significantly lower than the mean for the tenth grade.
- (b) Axillary hair - same as pubic hair component.
- (c) Breast development - mean for the eighth grade was significantly lower than either of those for the ninth or tenth grades and there was no difference between the means of the ninth and tenth grades.
- (d) Menarcheal experience - mean for the eighth grade was significantly lower than the mean for the ninth grade and there were no significant differences between means for the eighth and tenth or ninth and tenth grades.

For the males, the "F" test was significant for all four components at both the .05 and .01 levels of confidence. The pubic hair component mean differences were significantly lower for eighth grade than ninth; for eighth grade than tenth; and for ninth grade than tenth grade. The axillary hair, facial hair and genital growth component comparisons all disclosed means for the eighth grade significantly lower than means for either the ninth or tenth grade and disclosed no significant differences between means for the ninth and tenth grades.

As indicated in Appendix C, the means for the tenth grade female physical components were found to be between those of the eighth and ninth grades, while the means for the eighth and ninth grade female components were in the anticipated logical order. Likewise, the means for the tenth grade male physical components were found to be between those of the eighth and ninth grade male components on three of the four physical components, the exception being pubic hair development. The means for the eighth and ninth grade male physical components were also in logical order.

Since no gross inconsistencies were found in the rating instrument and the eighth and ninth grade data were compatible, it was rather clear that the administration of the Puberty Rating Scale by the high school physical education teachers in rating the tenth grade students was the source of the incongruous data. The discrepancy may have been due to an unconscious comparison of

tenth grade students with upper classmen by the high school raters, while the junior high school raters had the opposite orientation or set.

Therefore, although the data does not support the null hypothesis pertaining to grade level differences due to the physical maturity factor, it must be stated that whether physical maturity was a significant factor in grade level differences between ninth and tenth grade students was not ascertainable on the basis of the data herein presented.

Intellectual Maturity. The question of intellectual maturity as a factor in grade level differences was answered using data collected through administration of the Otis Quick Scoring Mental Ability Test, New Edition. Grade level variation found for intellectual maturity is shown in Table XII. The "F" value (Table XII)

TABLE XII

ANALYSIS OF VARIANCE OF THE INTELLECTUAL MATURITY VARIABLE FOR EIGHTH, NINTH AND TENTH GRADE STUDENTS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Grade Level	2	930.250	465.125	4.889**	3.03
Sex	1	48.000	48.000	0.505	3.88
Interaction	2	29.750	14.875	0.156	3.03
Within Sets	294	27970.813	95.139		
Total	299	28878.813			
**Significant at the .01 level of confidence					

of 4.889 was greater than the indicated value of 3.03 required for significance at the .05 level of confidence for grade level variation. This "F" value was also significant at the one per cent level of confidence. The data did not support the null hypothesis.

Tukey's contrasts for several means revealed an eighth grade mean significantly lower than either of those for the ninth or tenth grades and no significant difference between the means of the ninth and tenth grades. As presented in Table XIII, the means for intellectual maturity of the eighth, ninth and tenth grades

TABLE XIII
INTELLECTUAL MATURITY MEANS AND STANDARD DEVIATIONS
FOR THE EIGHTH, NINTH AND TENTH GRADE LEVELS

Grade Level	Mean	Standard Deviation
8	55.110	9.842
9	58.600	9.127
10	59.050	10.016

were in a logical, anticipated order, indicative of an ascending maturity by grade level. The null hypothesis pertaining to the intellectual maturity factor between eighth and ninth grade students was not supported. However, the null hypothesis regarding ninth and tenth grade intellectual maturity differences was supported.

Emotional Maturity. Measures of the emotional maturity variable, as measured by the California Test of Personality, were subjected to analysis of variance. The results of this analysis are

reported in Table XIV. The .05 level of confidence required a value of 3.03 to be significant. Since the "F" value (Table XIV) of 5.125 exceeded the required value for significance, the null hypothesis was not supported on the basis of existent differences in grade level variation.

TABLE XIV

ANALYSIS OF VARIANCE OF THE EMOTIONAL MATURITY
VARIABLE FOR EIGHTH, NINTH AND TENTH GRADE STUDENTS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Grade Level	2	1842.000	921.000	5.125**	3.03
Sex	1	415.000	415.000	2.309	3.88
Interaction	2	1003.000	501.500	2.791	3.03
Within Sets	294	52833.000	179.704		
Total	299	56093.000			

**Significant at the .01 level of confidence

The comparison of means utilizing Tukey's contrasts disclosed means for the ninth and tenth grades significantly greater than the mean for the eighth grade. No statistically significant difference between the means of the ninth and tenth grades was indicated. The grade level mean values for emotional maturity, as shown in Table XV, indicate an increased emotional maturity score corresponding with grade level advancement. The mean values were 60.600, 65.160, and 66.350, respectively, for the eighth, ninth and tenth grade levels. The null hypothesis concerning grade level differences between eighth and ninth grade students

was not supported while the null hypothesis pertaining to ninth and tenth grade students was supported by the data.

TABLE XV

EMOTIONAL MATURITY MEANS AND STANDARD DEVIATIONS
FOR THE EIGHTH, NINTH AND TENTH GRADE LEVELS

Grade Level	Mean	Standard Deviation
8	60.600	15.174
9	65.160	11.840
10	66.350	13.117

Social Maturity. The California Test of Personality was also used to measure the social maturity variable. The analysis of variance for this factor disclosed an "F" value for grade level differences of 4.440. This value, as indicated in Table XVI, was significant at the .05 level of confidence. The null hypothesis was not supported.

No significant differences between the means of the eighth and ninth grades or the ninth and tenth grades were revealed by Tukey's method of comparison. There was, however, a significant difference between the means of the eighth and tenth grades. The null hypotheses were supported for the eighth-ninth and ninth-tenth comparisons and not supported for the eighth-tenth grade comparison. A descending order of means, from tenth to eighth grade is shown in Table XVII, but the only difference of significance was that between the means of the eighth and tenth grades.

TABLE XVI
ANALYSIS OF VARIANCE OF THE SOCIAL MATURITY VARIABLE
FOR EIGHTH, NINTH AND TENTH GRADE STUDENTS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Grade Level	2	1351.000	675.500	4.440*	3.03
Sex	1	3021.000	3021.000	19.858**	3.88
Interaction	2	865.000	432.500	2.843	3.03
Within Sets	294	44727.000	152.133		
Total	299	49964.000			

*Significant at .05 level of confidence
**Significant at .01 level of confidence

TABLE XVII

SOCIAL MATURITY MEANS AND STANDARD DEVIATIONS
FOR THE EIGHTH, NINTH AND TENTH GRADE LEVELS

Grade Level	Mean	Standard Deviation
8	60.720	13.629
9	64.610	12.827
10	65.650	11.655

Analysis of Maturity Variables and Sex Differences

Of the four adolescent maturational variables under consideration, significant sex differences were indicated only for the physical maturity and social maturity factors.

Physical Maturity. The analysis of variance for the physical maturity factor (Table X, page 84) produced an "F" value of 52.569 for sex differences which was in great excess of .05 and .01 level of confidence values. The null hypothesis pertaining to sex differences due to physical maturity was not supported.

Mean composite physical maturity scores and standard deviations for each sex are given in Table XVIII. The mean score difference was 2.603.

TABLE XVIII

MEAN COMPOSITE PHYSICAL MATURITY SCORES AND
STANDARD DEVIATIONS FOR MALE AND FEMALE STUDENTS

Sex	Mean	Standard Deviation
Male	10.807	3.530
Female	13.410	3.172

Figure 4 illustrates the differences between sexes for each grade level with respect to the physical maturity mean scores (Appendix B). Although the means for the ninth grade appeared to be out of sequence as discussed in the foregoing section, when graphed, it can be observed from Figure 4 that the male-female physical maturational differences became less as the grade level

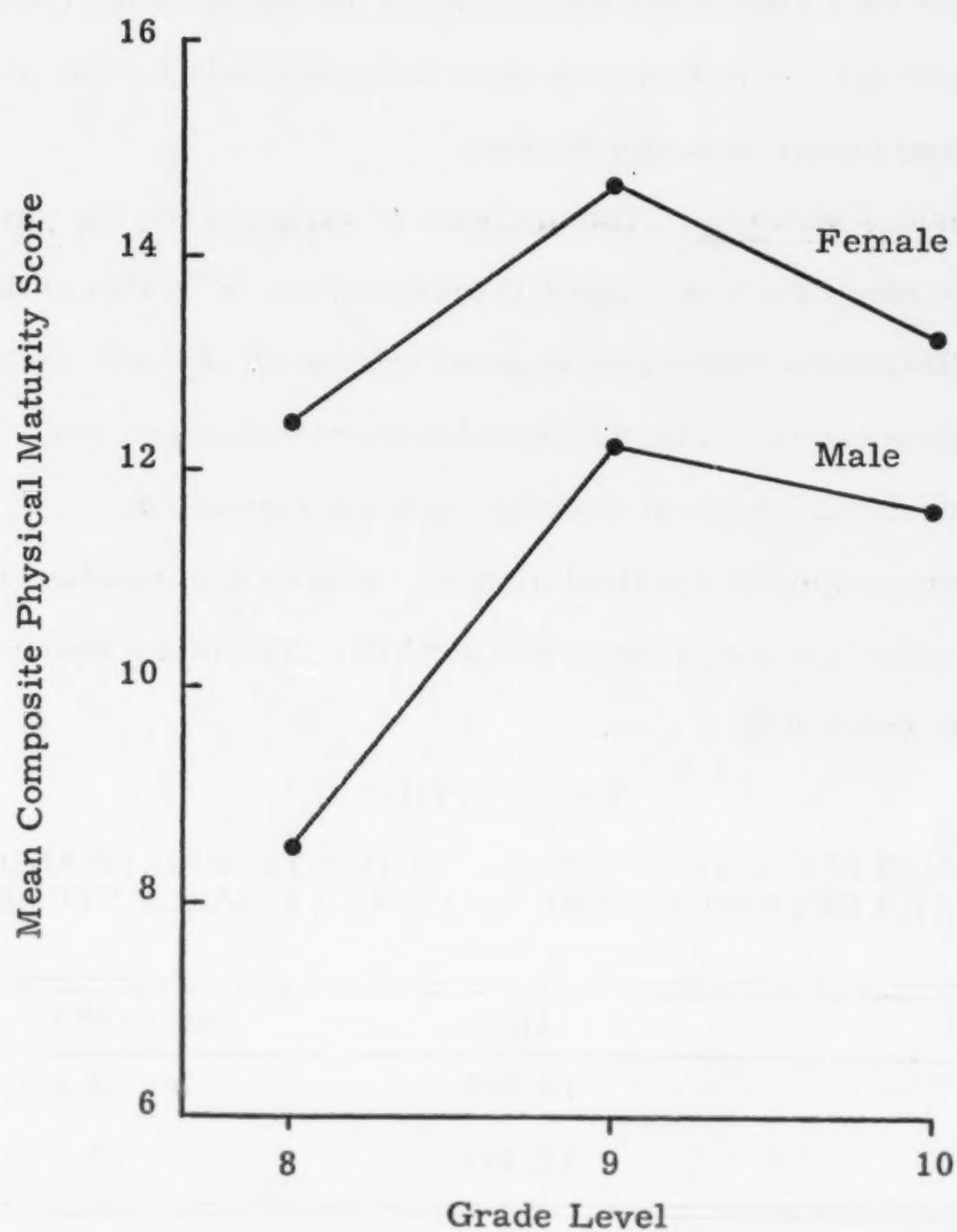


FIGURE 4

PHYSICAL MATURITY SEX DIFFERENCES FOR EIGHTH,
NINTH AND TENTH GRADE STUDENTS

increased. The eighth grade point difference between mean scores for each sex was 3.90 which decreased to 2.25 for the ninth grade and to 1.46 for the tenth grade. These differences were in keeping with the research findings discussed in Chapter II which present consistent evidence that females entered the pubertal spurt earlier than males, and at about age 14 or 15 years (ninth grade), the gap began to close and physical maturity differences continued to decrease until differences became stable at adulthood.

Intellectual Maturity. The close similarity between the mean scores of the sexes for the intellectual maturity variable is presented in Table XIX, the difference being only .80.

TABLE XIX

MEAN INTELLECTUAL MATURITY SCORES AND STANDARD DEVIATIONS FOR MALE AND FEMALE STUDENTS

Sex	Mean	Standard Deviation
Male	57.187	10.014
Female	57.987	9.623

This similarity is quite apparent in Figure 5, graphed from grade level and sex means given in Appendix B.

The variation found for sex in the analysis of variance for the intellectual maturity variable was not significant (Table XII, page 87). The data, therefore, supported the null hypothesis.

Emotional Maturity. Analysis of the mean emotional maturity scores (Appendix B), as illustrated in Figure 6, revealed a wide

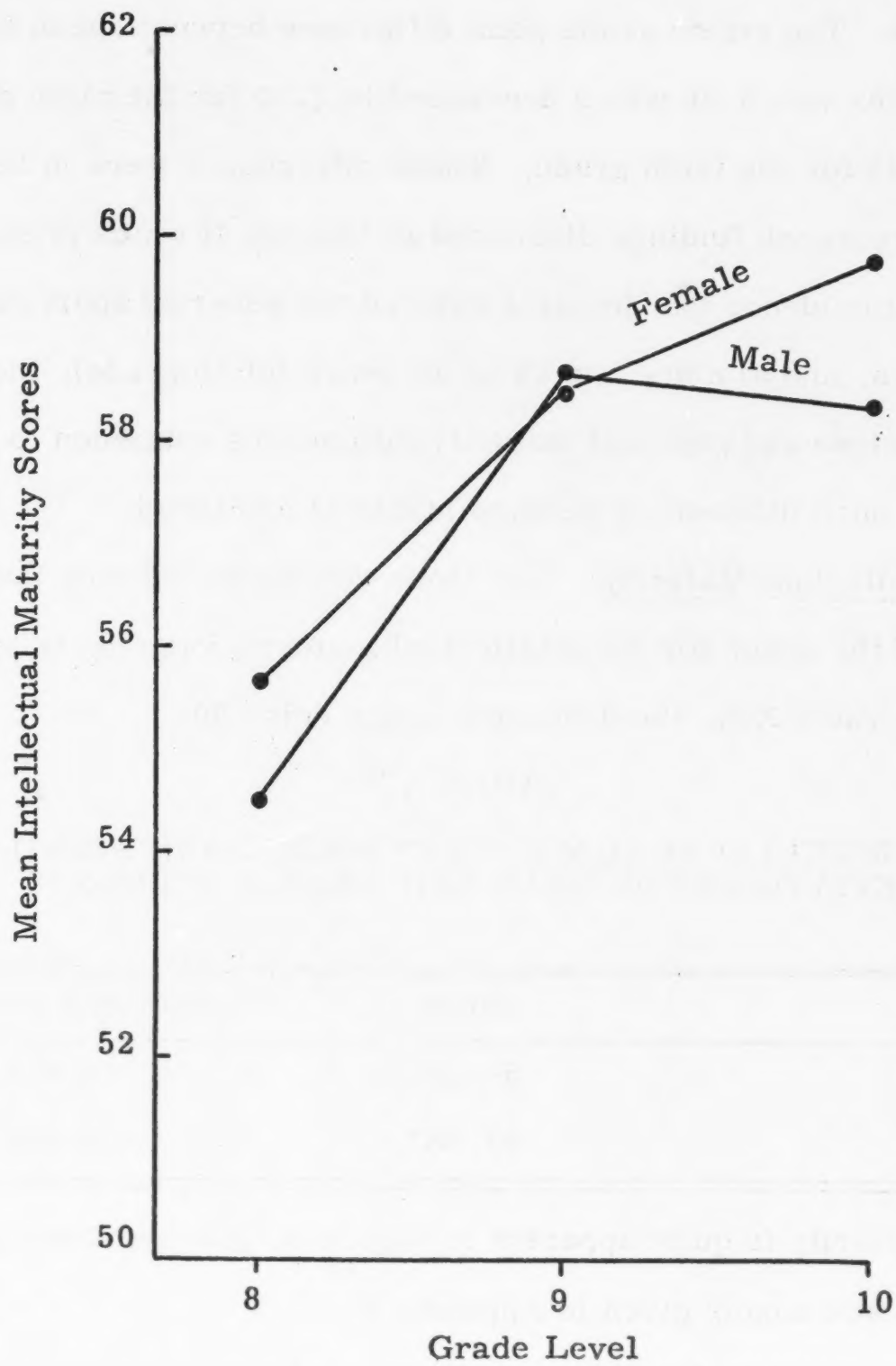


FIGURE 5

INTELLECTUAL MATURITY SEX DIFFERENCES FOR
EIGHTH, NINTH AND TENTH GRADE STUDENTS

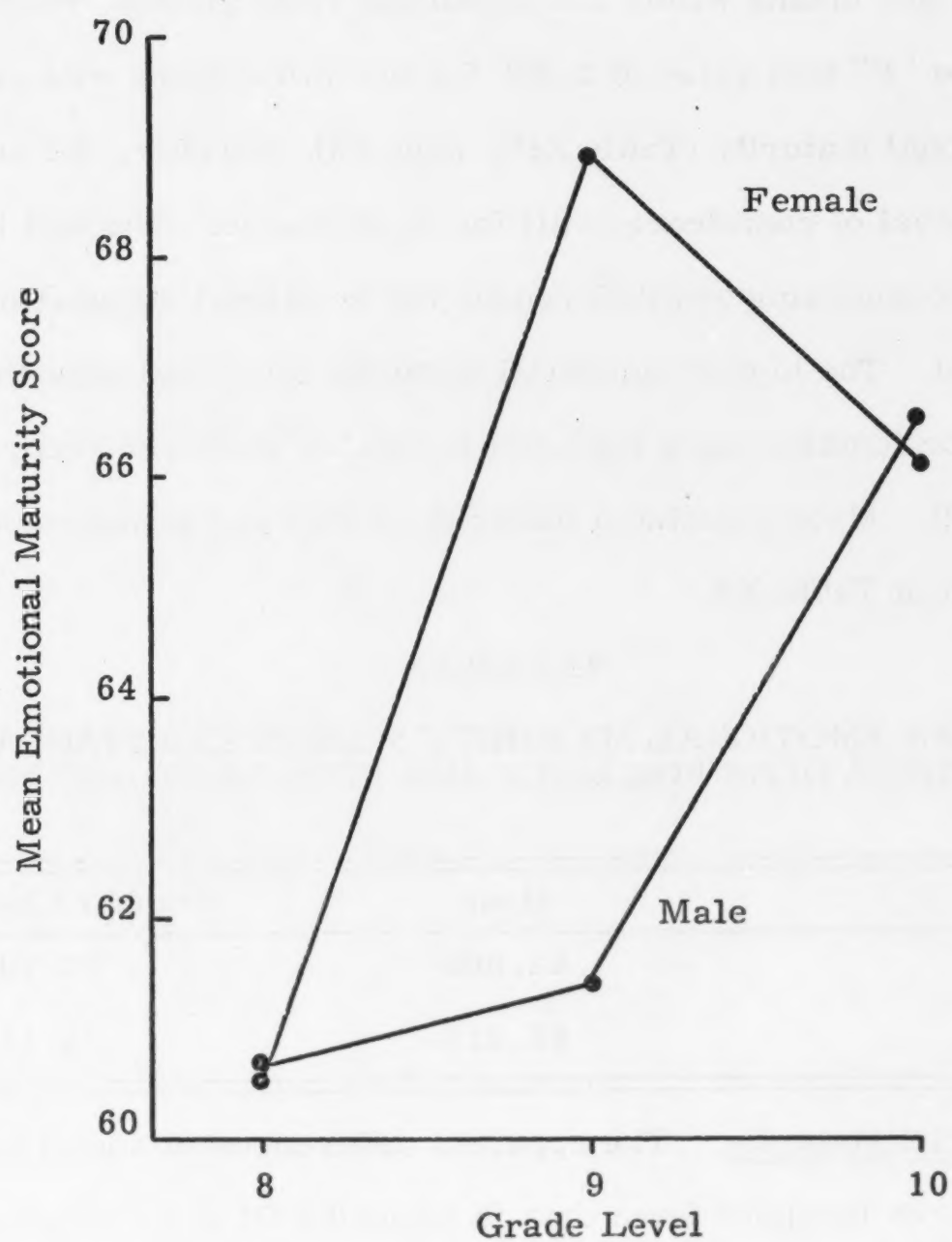


FIGURE 6

EMOTIONAL MATURITY SEX DIFFERENCES FOR EIGHTH,
NINTH AND TENTH GRADE STUDENTS

difference between sex means for the ninth grade but virtually identical sex means within the eighth and tenth grades, respectively.

The "F" test value of 2.309 for sex differences with respect to emotional maturity (Table XIV, page 89), however, did not meet the .05 level of confidence limit for significance. The null hypothesis concerning sex differences for emotional maturation was supported. The higher emotional maturity (personal adjustment) scores for females were expected in light of research reported in Chapter II. Mean emotional maturity scores and standard deviations are given in Table XX.

TABLE XX

MEAN EMOTIONAL MATURITY SCORES AND STANDARD DEVIATIONS FOR MALE AND FEMALE STUDENTS

Sex	Mean	Standard Deviation
Male	62.860	13.799
Female	65.213	13.445

Social Maturity. The apparent differences in social maturity mean scores (graphed from data in Appendix B) are displayed in Figure 7. As was the case for the emotional maturity factor, the greatest variation existed with the ninth grade. This was again interpreted to be a function of the California Test of Personality, used as the measuring instrument for both variables.

The mean scores and standard deviations for each sex with regard to social maturity are given in Table XXI. The mean score difference was. 6.345.

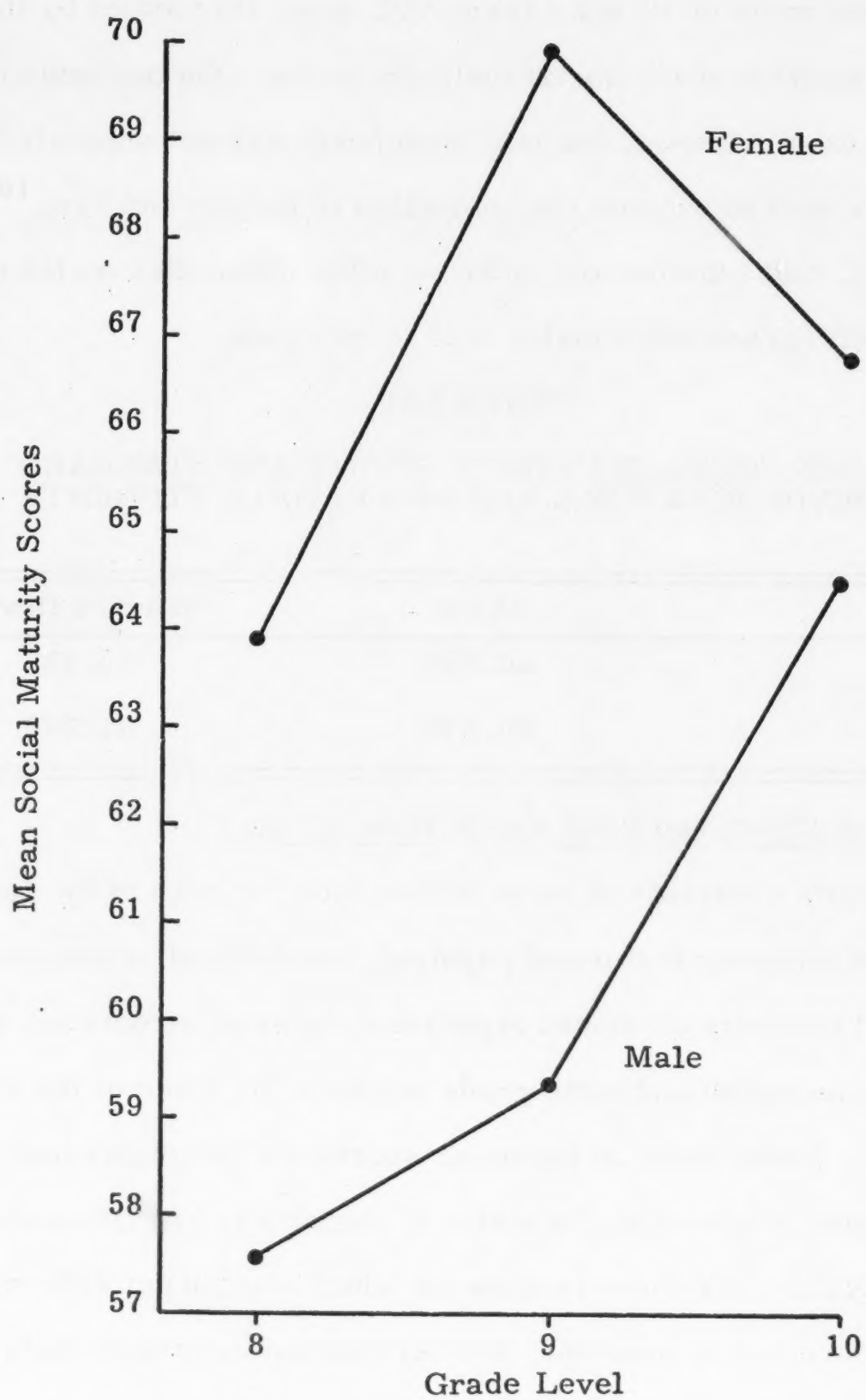


FIGURE 7

SOCIAL MATURITY SEX DIFFERENCES FOR EIGHTH,
NINTH AND TENTH GRADE STUDENTS

Both .05 and .01 level of confidence limits were exceeded by the "F" test value of 19.858 (Table XVI, page 91) yielded by the variance analysis of the social maturity factor. On the basis of this statistical evidence, the null hypothesis was not supported. These data tend to support the contention of Kuhlen and Lee,¹⁶⁶ and others, that females are more socially active than males prior to the twelfth grade when males tend to catch up.

TABLE XXI

MEAN SOCIAL MATURITY SCORES AND STANDARD
DEVIATIONS FOR MALE AND FEMALE STUDENTS

Sex	Mean	Standard Deviation
Male	60.488	13.137
Female	66.833	11.848

Analysis of Eighth and Ninth Grade Differences

Tukey's contrasts of mean differences for each of the four adolescent maturity factors of physical, intellectual, emotional and social maturity disclosed significant differences between the means of the eighth and ninth grade students for three of the four variables. Differences in the mean scores for the eighth and ninth grades, for each of the maturity variables, are illustrated in Table XXII. The three factors for which significant differences were produced were physical, intellectual and emotional maturity. Analyses of the grade level differences for all three factors indicated

¹⁶⁶Kuhlen and Lee, loc. cit.

the means for the eighth grade to be significantly lower than those of the ninth grade for each factor. Analysis of the social maturity variable for grade level differences between means for eighth and ninth grade students disclosed no significant differences. Significant differences were indicated, however, between sexes for this factor.

TABLE XXII

COMPARISON OF EIGHTH AND NINTH GRADE MEAN SCORES AND MEAN SCORE DIFFERENCES FOR PHYSICAL, INTELLECTUAL, EMOTIONAL AND SOCIAL MATURITY

Maturity Factor	Grade Level	Mean	Mean Difference
Physical Maturity	8	10.470	2.995*
	9	13.465	
Intellectual Maturity	8	55.110	3.490*
	9	58.600	
Emotional Maturity	8	60.600	4.560*
	9	65.160	
Social Maturity	8	60.720	3.890
	9	64.610	

*Tukey's Contrast significant at .05 level of confidence

Analysis of Ninth and Tenth Grade Differences

Comparisons of the means for the ninth and tenth grades for each of the adolescent maturational variables using Tukey's contrast of means revealed a significant difference between those means for only one of the four maturational factors, that being physical maturity. Differences between the means of the ninth and tenth grades are illustrated in Table XXIII.

Since gross inconsistencies occurred and reasonable doubt existed as to the validity of the physical maturity ratings made of the tenth grade students, any differences between the means of the ninth and tenth grades on the physical maturity variable must be considered with doubt as to their reliability. No significant differences existed, however, between means of the ninth and tenth grade students on intellectual, emotional and social maturational factors.

TABLE XXIII

COMPARISON OF NINTH AND TENTH GRADE MEAN SCORES
AND MEAN SCORE DIFFERENCES FOR PHYSICAL,
INTELLECTUAL, EMOTIONAL AND SOCIAL MATURITY

Maturity Factor	Grade Level	Mean	Mean Difference
Physical Maturity	9	13.465	1.075*
	10	12.390	
Intellectual Maturity	9	58.600	0.450
	10	59.050	
Emotional Maturity	9	65.160	1.190
	10	66.350	
Social Maturity	9	64.610	1.040
	10	65.650	

*Tukey's Contrast significant at .05 level of confidence

Analysis of the Data in Support of the General Hypothesis

Analysis of the data gathered for this study produced four significant findings. First, significant differences occurred among eighth, ninth and tenth grade students on all four of the adolescent maturational variables of physical, intellectual, emotional and social maturity. Secondly, male and female eighth, ninth and

tenth grade students were found to significantly differ with respect to physical and social maturity factors. Thirdly, eighth and ninth grade students exhibited significant differences on physical, intellectual, and emotional maturity factors. Lastly, ninth and tenth grade students demonstrated a significant difference for only one of the four maturity variables measured, that being physical maturity.

The four significant findings stated above tend to support the general research hypothesis of this study which states that ninth grade students, when compared to eighth and tenth grade students with respect to physical, intellectual, emotional and social maturity levels, more resemble tenth grade students than they resemble eighth grade students.

Summary

Analysis of the data pertaining to this study disclosed that eighth, ninth and tenth grade students differ significantly on the four maturational variables of physical, intellectual, emotional and social maturity.

It was further disclosed through the data analysis that adolescent male and female students in the eighth, ninth and tenth grades significantly differ with respect to levels of physical and social maturity.

Additionally, two facts revealed, which directly supported the general research hypothesis, were that eighth and ninth grade students were significantly different as to levels of physical,

intellectual and emotional maturity while ninth and tenth grade students were shown to differ significantly on only one of the maturity variables measured.

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

The preceding chapters of this report have presented the nature of the problem, research related to the maturity variables and school grade organization, research and statistical procedures, and analysis of the data. This chapter summarizes the previous chapters and presents the conclusions, their implications, and recommendations for further study.

Summary

The Problem. A review of the current literature disclosed a relatively new movement toward reorganizing the grade level structure of secondary education away from the traditional 7-8-9 junior high school organization to a loosely defined middle school arrangement encompassing grades seven and eight, but not grade nine. The displacement of grade nine was viewed as a school organizational problem which demanded possible solutions based upon facts concerning adolescent student development. It was also disclosed that the current secondary school grade reorganization movement was not founded on any developed scientific rationale based upon empirical evidence, although some documentation was found to support the contention that adolescents are now maturing earlier than was the case in 1909 when the 7-8-9 junior high school organization was initiated. While a small number of recent investigations based upon empirical data gathered from adolescent

student measurements was found, most research has relied upon existent literature and professional opinion. The lack of a sound rationale, based upon empirical evidence, for school grade level reorganization demonstrated a need for this study. With the need for the study established, the scientific determination of where to best place the ninth grade in the school organizational structure based upon student maturational resemblances and differences, became the purpose of this study.

This study, then, was made in order to ascertain the differences among adolescent students enrolled in the eighth, ninth and tenth grades of suburban school districts with respect to their levels of physical, intellectual, emotional and social maturity. In addition, the study was to ascertain whether ninth grade students, when compared on these maturity variables, more closely resembled eighth grade or tenth grade students.

Research Procedures. The population for this study was composed of 4,874 eighth, ninth and tenth grade students from two suburban St. Louis County, Missouri, school districts. A sample of 300 students consisting of 50 males and 50 females in each of grades eight, nine and ten was randomly selected for measurement and statistical analysis.

Measurement of the four maturational variables was conducted as follows:

1. Physical Maturity - used the Puberty Rating Scale developed for the purpose. The scale was based upon findings of previous adolescent physical maturity research and advice from a recognized pediatric specialist. Four criterion variables for each sex

were rated. Administration of the scale was accomplished through ratings of physical development made by the physical education teachers of the students in the sample.

2. Intellectual Maturity - employed the Otis Quick-Scoring Mental Ability Test: New Edition. Only raw scores were used for comparisons and analyses.
3. Emotional Maturity - utilized the Personal Adjustment portion of the California Test of Personality.
4. Social Maturity - used the Social Adjustment portion of the California Test of Personality.

The statistical analysis for the study consisted primarily of a series of four two-way analyses of variance (grade by sex) followed by employment of Tukey's contrast of means where the "F" values were found to be significant. After the scores for each of the variables had been correlated, utilizing the Pearson Product-Moment formula, and after Kuder-Richardson Formula 20 reliabilities were calculated for the physical maturity component elements, the analyses of variance were employed to answer the research questions concerning grade level and sex differences due to each of the maturity variables. Questions of specific grade level differences for each maturity variable were answered through application of Tukey's contrast method for the multiple comparison of means.

Findings. The findings presented below are based upon the data discussed in Chapter IV of this report. The findings were as follows:

1. The physical maturity level of students was found to be a significant factor in differences among the eighth, ninth and tenth

grade levels. Eighth grade students were found to be significantly less physically mature than either ninth or tenth grade students. Although ninth and tenth grade students differed significantly on the physical maturity variable, the analysis of the data indicated that the students in the ninth grade were more physically mature than the tenth grade students. The data for this comparison, however, were shown to be of doubtful reliability due to the subjective nature of assessment of physical development.

2. The students' intellectual maturity level was shown to be a significant factor with reference to eighth, ninth and tenth grade level differences. Eighth and ninth grade students differed significantly on the intellectual maturity variable, with the eighth grade students shown to be less mature intellectually than either ninth grade or tenth grade students. Ninth and tenth grade students were not found to differ significantly with regard to their intellectual maturity levels.

3. Significant differences among the eighth, ninth and tenth grade levels due to the students' emotional maturity level were evidenced. Eighth grade students were found to be significantly less mature emotionally than either ninth or tenth grade students. Ninth grade students were shown to be no different, maturationally, from tenth grade students with respect to their emotional maturity levels.

4. Eighth, ninth and tenth grade students were found to differ significantly among the respective grade levels when compared

on the maturational factor of social maturity. No meaningful differences were found between either eighth and ninth grade students or ninth and tenth grade students in relation to levels of social maturity. Eighth grade students were shown to be significantly less socially mature than tenth grade students.

5. Male and female adolescent eighth, ninth and tenth grade students were found to differ, to a significant degree, on the maturational factors of physical and social maturity. Female students in the eighth, ninth and tenth grades tend to be more physically mature and socially aware than their male contemporaries.

6. No evidence of significant intellectual or emotional maturity differences between adolescent students in the eighth, ninth and tenth grades, as differentiated by sex, was found.

7. The general research hypothesis that: ninth grade students, when compared to eighth and tenth grade students with respect to physical, intellectual, emotional and social maturity levels, more resemble tenth grade students than they resemble eighth grade students was supported by the data and therefore was accepted as valid.

Conclusions

Within the limitations set forth in Chapter I of this report, and in view of the above findings, it was concluded that since suburban eighth, ninth and tenth grade adolescent students are not a homogeneous group with respect to physical, intellectual,

emotional social maturity levels, and since eighth grade students are less mature than ninth grade students, it appears that the traditional 6-3-3 school grade organization pattern with provisions for the 7-8-9 junior high school does not provide for the best placement of the ninth grade in terms of these maturity factors.

Therefore it follows that:

1. The important maturational similarities between ninth and tenth grade students and the maturational differences between students of the eighth and ninth grades suggest that an organization scheme which recognized these adolescent student likenesses and differences is in order.

- a) A school educational environment with provisions for extensive common learning experiences for ninth and tenth grade students would recognize and take maximum advantage of the adolescent developmental and maturational similarities.

- b) A school educational environment characterized by eighth grade student learning experiences different from those of the ninth grade students would recognize and take maximum advantage of adolescent developmental and maturational differences.

2. If, in school districts like or similar to the school districts herein described, a choice of whether to place the ninth grade in a 7-9 junior high school unit or in a 9-12 senior high school unit based upon student, physical, intellectual, emotional and social

maturity levels is to be made, the ninth grade would best be placed in the 9-12 senior high school unit.

It was also concluded that differences between male and female students in the eighth, ninth and tenth grades appeared not to support the contention that adolescent females are significantly more mature than adolescent males, and would, therefore, find beneficial a separate or different educational setting.

Implications

Although the foregoing conclusions and those of some recent school grade reorganization studies, reviewed in Chapter II of this report, suggest that a school grade organization structure which embodies a three-year middle school (grades 6-8) and a four-year high school (grades 9-12) provides for the best placement of the ninth grade in terms of adolescent student maturity factors, it is possible that an appropriate adolescent educational program based upon the conclusions of this report could be developed in a school district without radically changing the grade organization and/or providing additional facilities. A broad concept of school organization which recognized adolescent maturity differences and similarities would necessitate revision of:

1. Junior and senior high school curricular and extra-curricular organization and planning to include increased common educational experiences for ninth and tenth grade students while the eighth-ninth grade common programs were being diminished.

2. In-service staff education to increase staff awareness of the needs peculiar to each adolescent maturity level so that the students might be better served in terms of maturity requirements.

3. School-community relations programs to better inform the school district patrons of adolescent likenesses and differences so that new programs would be fully appreciated and supported.

4. The traditional approach to secondary school administration so that ninth grade students would be considered to be more than children and opportunities for maturational development could be broadened within the framework of the school educational program.

Recommendations for Further Study

Several areas related to this study appear to warrant further investigation. The following recommendations are presented:

1. That studies of adolescent maturity be conducted with racial and socio-economic groups other than middle-class, white, suburbanites and including Negroes, Spanish-Americans, inner-city students, and rural students so that the complete spectrum of adolescent maturity factors may be analyzed.

2. That studies be made utilizing various approaches for measuring adolescent student maturity factors, especially physical maturity. Perhaps a study utilizing adolescent height-weight and general size relationships to assess physical maturity together with growth curve analysis might be of value.

3. That studies be made to ascertain whether seventh grade students differ maturationally from eighth grade students, to the extent that eighth grade students differ maturationally from ninth grade students.

4. That studies be made to ascertain whether maturational differences between the sexes are significant enough to warrant a reevaluation of traditional school organization.

5. That individual school systems study the maturity levels of their students along with other developmental aspects of adolescence when planning grade reorganization.

6. That programs in middle schools, junior high schools and senior high schools be analyzed to determine if the needs of adolescent students of differing maturity levels are being met by the various educational programs.

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MEANS AND STANDARD DEVIATIONS OF OBSERVED PHYSICAL
MATURITY AND MEASURED INTELLECTUAL, EMOTIONAL
AND SOCIAL MATURITY VARIABLES FOR EIGHTH
GRADE STUDENTS

Sex	Variable	Mean	Standard Deviation
Male	Pubic Hair	2.50	0.883
	Axillary Hair	2.10	0.860
	Facial Hair	1.66	0.710
	Genital Growth	2.45	0.862
	Intellectual Maturity	54.56	9.934
	Emotional Maturity	60.64	15.811
	Social Maturity	57.58	14.269
Female	Pubic Hair	3.13	0.921
	Axillary Hair	2.99	0.908
	Breast Development	2.92	0.945
	Menarcheal Experience	3.38	1.107
	Intellectual Maturity	55.66	9.917
	Emotional Maturity	60.56	14.510
	Social Maturity	63.86	12.174

MEANS AND STANDARD DEVIATIONS OF OBSERVED PHYSICAL
MATURITY AND MEASURED INTELLECTUAL, EMOTIONAL
AND SOCIAL MATURITY VARIABLES FOR NINTH
GRADE STUDENTS

Sex	Variable	Mean	Standard Deviation
Male	Pubic Hair	3.42	1.017
	Axillary Hair	3.00	0.985
	Facial Hair	2.54	0.999
	Genital Growth	3.44	1.038
	Intellectual Maturity	58.64	8.988
	Emotional Maturity	61.40	12.152
	Social Maturity	59.34	13.317
Female	Pubic Hair	3.72	0.820
	Axillary Hair	3.59	0.952
	Breast Development	3.44	0.779
	Menarcheal Experience	3.94	0.870
	Intellectual Maturity	58.56	9.263
	Emotional Maturity	68.92	10.219
	Social Maturity	69.88	9.807

MEANS AND STANDARD DEVIATIONS OF OBSERVED PHYSICAL
MATURITY AND MEASURED INTELLECTUAL, EMOTIONAL
AND SOCIAL MATURITY VARIABLES FOR TENTH
GRADE STUDENTS

Sex	Variable	Mean	Standard Deviation
Male	Pubic Hair	3.73	0.856
	Axillary Hair	2.59	0.870
	Facial Hair	2.27	1.055
	Genital Growth	3.13	0.720
	Intellectual Maturity	58.36	10.533
	Emotional Maturity	66.54	12.370
	Social Maturity	64.54	10.515
Female	Pubic Hair	3.30	0.825
	Axillary Hair	2.87	1.019
	Breast Development	3.36	0.900
	Menarcheal Experience	3.59	0.792
	Intellectual Maturity	59.74	9.421
	Emotional Maturity	66.16	13.821
	Social Maturity	66.76	12.595

APPENDIX B

MALE AND FEMALE PHYSICAL MATURITY MEANS AND
STANDARD DEVIATIONS BY GRADE LEVEL

Sex	Grade Level	Mean	Standard Deviation
Male	8	8.520	2.921
Male	9	12.240	3.658
Male	10	11.660	2.732
Female	8	12.420	3.353
Female	9	14.690	2.760
Female	10	13.120	2.935

APPENDIX B

MALE AND FEMALE PHYSICAL MATURITY MEANS AND
STANDARD DEVIATIONS BY GRADE LEVEL

Sex	Grade Level	Mean	Standard Deviation
Male	8	8.520	2.921
Male	9	12.240	3.658
Male	10	11.660	2.732
Female	8	12.420	3.353
Female	9	14.690	2.760
Female	10	13.120	2.935

MALE AND FEMALE INTELLECTUAL MATURITY MEANS AND
STANDARD DEVIATIONS BY GRADE LEVEL

Sex	Grade Level	Mean	Standard Deviation
Male	8	54.560	9.934
Male	9	58.640	8.988
Male	10	58.360	10.533
Female	8	55.660	9.717
Female	9	58.560	9.263
Female	10	59.740	9.421

MALE AND FEMALE EMOTIONAL MATURITY MEANS AND
STANDARD DEVIATIONS BY GRADE LEVEL

Sex	Grade Level	Mean	Standard Deviation
Male	8	60.640	15.811
Male	9	61.400	12.152
Male	10	66.540	12.370
Female	8	60.560	14.510
Female	9	68.920	10.220
Female	10	66.160	13.821

MALE AND FEMALE SOCIAL MATURITY MEANS AND
STANDARD DEVIATIONS BY GRADE LEVEL

Sex	Grade Level	Mean	Standard Deviation
Male	8	57.580	14.269
Male	9	59.340	13.317
Male	10	64.540	10.515
Female	8	63.860	12.174
Female	9	69.880	9.807
Female	10	66.760	12.595

ANALYSIS OF WASTE WATER FROM THE TREATMENT PLANT					
Source of Effluent	Volume of Effluent	Concentration of Pollutants	Weight of Pollutants	Percentage of Total	Notes
Domestic	100,000	100	10,000	10%	
Industrial	200,000	200	40,000	40%	
Commercial	50,000	50	5,000	5%	
Public Works	10,000	10	1,000	1%	
Other	5,000	5	500	0.5%	
Total	365,000	365	36,500	100%	

APPENDIX C

ANALYSIS OF VARIANCE OF EIGHTH, NINTH AND TENTH
GRADE MALE STUDENTS PUBIC HAIR DEVELOPMENT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Groups	2	50.613	25.307	28.598**	3.06
Within	147	130.080	0.885		
Total	149	180.693			

**Significant at the .01 level of confidence

ANALYSIS OF VARIANCE OF EIGHTH, NINTH AND TENTH GRADE
MALE STUDENTS AXILLARY HAIR DEVELOPMENT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Groups	2	17.373	8.687	10.659**	3.06
Within	147	119.800	0.815		
Total	149	137.173			

**Significant at the .01 level of confidence

ANALYSIS OF VARIANCE OF EIGHTH, NINTH AND TENTH
GRADE MALE STUDENTS FACIAL HAIR DEVELOPMENT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Groups	2	23.453	11.727	12.444**	3.06
Within	147	138.520	0.942		
Total	149	161.973			

**Significant at the .01 level of confidence

ANALYSIS OF VARIANCE OF EIGHTH, NINTH AND TENTH
GRADE MALE STUDENTS GENITAL DEVELOPMENT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Groups	2	27.640	13.820	16.357**	3.06
Within	147	124.200	0.845		
Total	149	151.840			

**Significant at the .01 level of confidence

ANALYSIS OF VARIANCE OF EIGHTH, NINTH AND TENTH
GRADE FEMALE STUDENTS PUBIC HAIR DEVELOPMENT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Groups	2	9.223	4.612	6.164**	3.06
Within	147	109.985	0.748		
Total	149	119.208			

**Significant at the .01 level of confidence

ANALYSIS OF VARIANCE OF EIGHTH, NINTH AND TENTH GRADE
FEMALE STUDENTS AXILLARY HAIR DEVELOPMENT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Groups	2	14.880	7.440	7.897**	3.06
Within	147	138.495	0.942		
Total	149	153.375			

**Significant at the .01 level of confidence

ANALYSIS OF VARIANCE OF EIGHTH, NINTH AND TENTH
GRADE FEMALE STUDENTS BREAST DEVELOPMENT

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Groups	2	7.840	3.920	4.988**	3.06
Within	147	115.520	0.786		
Total	149	123.360			

**Significant at the .01 level of confidence

ANALYSIS OF VARIANCE OF EIGHTH, NINTH AND TENTH
GRADE FEMALE STUDENTS MENARCHEAL EXPERIENCE

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	"F" Value	.05 Limit
Groups	2	8.003	4.002	4.509*	3.06
Within	147	130.445	0.887		
Total	149	138.448			

STATE OF NEW YORK
OFFICE OF THE ATTORNEY GENERAL
ALBANY, N.Y.

NAME	RESIDENCE	DATE
JOHN J. ...	...	...
...	...	...
...	...	...
...	...	...

APPENDIX D

EIGHTH, NINTH AND TENTH GRADE MALE PUBIC HAIR
DEVELOPMENT FACTOR MEANS AND
STANDARD DEVIATIONS

Grade Level	Mean	Standard Deviation
8	2.320	0.904
9	3.240	1.031
10	3.720	0.849
Grand	3.093	1.098

EIGHTH, NINTH AND TENTH GRADE MALE AXILLARY HAIR
DEVELOPMENT FACTOR MEANS AND
STANDARD DEVIATIONS

Grade Level	Mean	Standard Deviation
8	2.000	0.872
9	2.820	0.973
10	2.540	0.830
Grand	2.453	0.956

EIGHTH, NINTH AND TENTH GRADE MALE FACIAL HAIR
DEVELOPMENT FACTOR MEANS AND
STANDARD DEVIATIONS

Grade Level	Mean	Standard Deviation
8	1.460	0.727
9	2.360	1.073
10	2.220	1.045
Grand	2.013	1.039

EIGHTH, NINTH AND TENTH GRADE MALE GENITAL
DEVELOPMENT FACTOR MEANS AND
STANDARD DEVIATIONS

Grade Level	Mean	Standard Deviation
8	2.280	0.873
9	3.260	1.092
10	3.100	0.728
Grand	2.880	1.006

EIGHTH, NINTH AND TENTH GRADE FEMALE PUBIC HAIR
DEVELOPMENT FACTOR MEANS AND
STANDARD DEVIATIONS

Grade Level	Mean	Standard Deviation
8	3.130	0.921
9	3.720	0.820
10	3.300	0.825
Grand	3.383	0.892

EIGHTH, NINTH AND TENTH GRADE FEMALE AXILLARY HAIR
DEVELOPMENT FACTOR MEANS AND
STANDARD DEVIATIONS

Grade Level	Mean	Standard Deviation
8	2.990	0.908
9	3.590	0.952
10	2.870	1.019
Grand	3.150	1.011

EIGHTH, NINTH AND TENTH GRADE FEMALE BREAST
DEVELOPMENT FACTOR MEANS AND
STANDARD DEVIATIONS

Grade Level	Mean	Standard Deviation
8	2.920	0.945
9	3.440	0.779
10	3.360	0.900
Grand	3.240	0.907

EIGHTH, NINTH AND TENTH GRADE FEMALE MENARCHEAL
EXPERIENCE FACTOR MEANS AND STANDARD DEVIATIONS

Grade Level	Mean	Standard Deviation
8	3.380	1.107
9	3.940	0.870
10	3.590	0.792
Grand	3.637	0.961

MATURITY VARIABLE SCORES FOR EIGHTH GRADE GIRLS

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
1	3.5	3.0	4.0	3.5	14.0	57	66	70
2	3.5	2.5	3.5	3.5	13.0	61	69	75
3	3.0	2.5	3.0	2.5	11.0	65	75	75
4	2.0	2.0	2.0	2.0	8.0	55	77	84
5	2.0	2.0	2.0	2.0	8.0	46	40	70
6	3.0	3.0	3.0	3.0	12.0	53	76	77
7	4.5	4.5	4.5	4.5	18.0	49	58	61
8	3.5	3.5	3.5	4.0	14.5	60	54	56
9	2.0	2.0	2.0	2.0	8.0	60	81	82
10	3.0	3.0	3.0	3.0	12.0	41	81	80
11	2.5	2.5	2.5	3.0	10.5	39	38	59
12	3.5	3.5	3.5	3.5	14.0	61	42	45
13	3.0	3.0	3.0	3.0	12.0	64	24	49
14	3.5	3.5	3.5	3.5	14.0	53	61	60
15	4.0	4.0	3.5	4.0	15.5	60	77	76
16	3.0	3.0	3.0	3.0	12.0	61	71	78
17	4.0	3.0	4.0	3.5	14.5	52	83	76
18	3.5	3.0	3.5	4.0	14.0	71	69	62
19	3.0	2.5	2.5	3.0	11.0	61	73	86
20	4.0	4.0	3.5	3.0	14.5	62	71	74
21	4.5	5.0	3.5	5.0	18.0	66	60	49
22	1.0	1.5	2.0	1.0	5.5	61	68	61
23	3.0	3.0	2.0	1.0	9.0	39	48	49
24	2.5	1.5	1.5	1.0	6.5	70	62	81
25	4.5	4.0	3.0	5.0	16.5	51	67	66

MATURITY VARIABLE SCORES FOR EIGHTH GRADE GIRLS (continued)

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
26	4.5	4.5	4.0	2.5	15.5	47	56	63
27	4.5	4.5	3.5	5.0	17.5	65	60	48
28	3.5	3.5	4.0	5.0	16.0	39	37	39
29	5.0	5.0	5.0	5.0	20.0	65	60	69
30	4.0	4.0	4.0	5.0	17.0	52	63	69
31	3.0	3.0	1.5	5.0	12.5	52	72	76
32	3.0	3.0	2.0	5.0	13.0	45	51	59
33	3.0	3.0	1.5	4.0	11.5	59	68	63
34	2.0	2.0	2.5	4.0	10.5	39	63	63
35	1.5	1.5	1.0	4.0	8.0	30	35	43
36	2.0	2.5	2.0	5.0	11.5	60	77	64
37	3.0	2.0	2.0	3.0	10.0	67	44	55
38	3.5	3.0	2.5	3.5	12.5	53	39	52
39	1.0	1.5	1.0	3.5	7.0	53	80	79
40	3.5	3.5	4.0	3.0	14.0	45	52	59
41	3.0	3.0	3.0	3.0	12.0	62	69	50
42	2.0	2.0	2.0	2.0	8.0	63	70	47
43	3.5	3.5	3.5	4.0	14.5	44	50	65
44	4.5	4.5	4.5	4.5	18.0	67	54	53
45	3.0	3.0	3.0	3.0	12.0	68	56	67
46	3.5	3.0	4.0	3.5	14.0	68	67	71
47	3.5	2.5	3.5	3.5	13.0	61	48	56
48	3.0	2.5	3.0	2.5	11.0	44	66	72
49	2.0	2.0	2.0	2.0	8.0	65	72	70
50	2.0	2.0	2.0	2.0	8.0	52	28	40

MATURITY VARIABLE SCORES FOR NINTH GRADE GIRLS

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
1	5.0	5.0	5.0	5.0	20.0	38	72	83
2	3.0	2.5	3.0	2.5	11.0	49	48	53
3	3.5	3.0	4.0	3.5	14.0	59	55	71
4	4.5	4.5	3.0	4.0	16.0	47	76	70
5	3.0	3.0	3.0	4.0	13.0	49	51	59
6	4.5	4.5	2.0	4.0	15.0	63	56	50
7	2.5	2.0	2.5	2.5	9.5	63	71	76
8	5.0	5.0	4.5	4.0	18.5	53	73	68
9	3.5	3.0	4.0	4.0	14.5	54	69	65
10	3.5	3.0	3.5	4.0	14.0	57	74	68
11	4.0	4.0	3.5	4.5	16.0	75	57	63
12	4.0	4.0	3.5	4.5	16.0	64	62	68
13	4.0	4.0	4.0	4.0	16.0	43	87	72
14	4.0	4.0	4.0	4.0	16.0	65	76	76
15	4.5	4.5	4.5	4.5	18.0	64	82	76
16	4.0	4.0	4.0	4.0	16.0	73	85	88
17	4.5	4.5	4.5	4.5	18.0	71	79	78
18	4.5	4.5	4.5	5.0	18.5	70	72	74
19	3.5	3.5	4.0	4.0	15.0	51	70	72
20	4.5	4.5	4.5	5.0	18.5	67	85	86
21	4.0	4.0	3.5	5.0	16.5	70	60	67
22	5.0	5.0	3.0	5.0	18.0	66	68	73
23	3.0	3.0	3.0	3.0	12.0	63	75	78
24	4.0	4.0	4.0	4.0	16.0	58	73	73
25	4.0	4.0	2.0	1.0	11.0	52	65	45

MATURITY VARIABLE SCORES FOR NINTH GRADE GIRLS (continued)

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
26	5.0	5.0	5.0	4.5	19.5	43	51	53
27	5.0	5.0	4.5	5.0	19.5	69	72	70
28	4.5	4.5	3.5	3.0	15.5	49	60	71
29	3.0	3.5	2.5	3.0	12.0	72	64	84
30	5.0	5.0	4.0	3.0	17.0	53	64	49
31	4.0	4.0	3.5	5.0	16.5	59	77	69
32	3.5	3.5	3.0	5.0	15.0	73	83	75
33	2.5	3.0	2.5	4.0	13.0	54	76	79
34	3.0	3.0	3.0	5.0	14.0	59	75	76
35	4.0	4.0	3.0	5.0	16.0	51	63	67
36	4.0	4.0	3.5	5.0	16.5	48	76	72
37	2.0	2.0	2.0	4.0	10.0	65	69	63
38	3.0	3.0	2.0	4.0	12.0	58	51	63
39	2.0	3.0	3.0	3.0	11.0	45	59	75
40	4.0	4.0	2.5	5.0	15.5	67	58	60
41	2.5	2.0	2.5	3.0	10.0	48	73	52
42	3.0	3.0	3.0	3.0	12.0	47	61	62
43	4.0	4.0	4.0	4.0	16.0	51	80	73
44	4.0	1.0	3.0	3.5	11.5	58	71	66
45	3.0	2.5	3.5	3.0	12.0	71	75	74
46	2.5	3.0	3.0	3.5	12.0	61	79	83
47	3.5	3.5	4.0	3.0	14.0	53	67	77
48	3.0	2.0	3.0	3.5	11.5	67	74	69
49	4.0	2.5	4.0	4.5	15.0	57	46	73
50	2.5	2.5	3.5	3.0	11.5	66	81	87

MATURITY VARIABLE SCORES FOR TENTH GRADE GIRLS

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I		II					
	III	IV						
1	3.5	3.5	3.5	3.5	14.0	52	36	41
2	3.0	3.0	3.0	4.0	13.0	70	71	77
3	3.0	3.0	3.0	3.0	12.0	55	75	81
4	5.0	5.0	5.0	4.0	19.0	58	61	59
5	3.0	3.0	3.0	4.0	13.0	53	71	66
6	4.0	4.0	4.0	4.0	16.0	54	64	60
7	4.0	4.0	3.0	4.0	15.0	52	70	66
8	5.0	5.0	5.0	5.0	20.0	75	73	71
9	4.5	4.5	4.5	4.5	18.0	58	79	80
10	5.0	5.0	5.0	5.0	20.0	50	71	79
11	3.5	3.5	3.5	3.5	14.0	66	74	73
12	3.5	3.0	4.0	4.0	15.5	56	64	63
13	4.0	4.0	3.0	4.0	15.0	71	84	85
14	3.0	2.0	3.0	3.0	11.0	72	86	85
15	4.0	4.0	3.0	5.0	16.0	58	57	60
16	3.0	3.0	3.0	3.0	12.0	76	76	67
17	4.0	3.0	4.0	4.0	15.0	66	79	79
18	4.0	4.0	5.0	4.0	17.0	66	72	71
19	4.0	3.0	4.0	4.0	15.0	66	39	54
20	4.0	4.0	4.5	5.0	17.5	45	68	68
21	4.0	4.0	4.0	3.0	15.0	52	63	53
22	3.0	3.0	3.0	5.0	14.0	66	61	52
23	3.0	2.0	2.0	3.0	10.0	69	78	67
24	3.0	3.0	3.0	3.0	12.0	66	69	68
25	4.0	4.0	4.0	3.0	15.0	46	65	67

MATURITY VARIABLE SCORES FOR TENTH GRADE GIRLS (continued)

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
26	4.0	4.0	4.0	3.0	15.0	66	77	76
27	2.0	2.0	2.0	2.0	8.0	42	44	40
28	4.0	4.0	3.0	3.0	14.0	67	83	83
29	3.0	3.0	3.0	3.0	12.0	65	83	79
30	3.0	3.0	3.0	3.0	12.0	57	74	61
31	4.0	2.0	4.0	3.0	13.0	41	46	46
32	3.0	2.0	2.0	2.5	9.5	73	74	84
33	2.5	2.0	2.0	4.0	10.5	42	48	68
34	1.5	1.5	2.0	3.0	8.0	66	66	65
35	3.0	1.5	3.0	4.5	12.0	75	57	61
36	3.5	2.0	5.0	4.5	15.0	57	49	59
37	3.0	1.5	3.0	2.5	10.0	62	87	85
38	3.0	1.5	3.0	4.0	11.5	54	79	79
39	4.0	2.0	4.0	4.5	14.5	58	88	85
40	3.0	2.0	3.5	3.5	12.0	55	36	46
41	2.5	2.0	5.0	4.0	14.5	63	70	62
42	2.5	2.0	2.5	3.0	10.5	37	56	60
43	2.0	2.0	2.5	2.5	9.0	63	77	77
44	1.5	2.0	2.0	3.0	8.5	63	48	53
45	2.0	2.0	4.0	2.0	10.0	70	70	79
46	3.0	2.0	2.5	3.0	10.5	53	77	79
47	3.0	2.0	3.0	4.0	12.0	58	48	68
48	2.0	2.0	2.0	4.0	10.0	53	60	53
49	3.0	2.0	3.0	4.0	12.0	62	40	39
50	3.0	2.0	3.0	2.5	10.5	67	65	59

MATURITY VARIABLE SCORES FOR EIGHTH GRADE BOYS

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
1	1.5	1.5	1.5	1.5	6.0	69	75	72
2	4.0	2.0	2.0	3.0	11.0	66	66	54
3	3.0	3.0	1.5	2.0	9.5	60	60	54
4	2.0	2.5	1.5	2.0	8.0	46	43	48
5	4.0	2.0	3.5	4.0	13.5	49	74	67
6	1.5	1.5	2.0	1.5	6.5	41	62	66
7	2.0	2.0	3.0	2.0	9.0	75	77	66
8	3.0	2.0	1.5	2.5	9.0	46	45	44
9	3.0	2.0	1.5	3.0	9.5	53	48	55
10	3.0	3.0	2.0	2.0	10.0	72	80	82
11	2.0	1.0	1.0	2.0	6.0	60	77	72
12	2.0	1.0	1.5	2.0	6.5	59	38	38
13	2.0	2.0	1.5	2.0	7.5	56	69	65
14	1.0	1.0	1.0	1.0	4.0	55	50	55
15	1.0	1.0	2.0	1.0	5.0	52	62	75
16	1.0	1.0	1.0	1.0	4.0	41	67	67
17	2.0	1.5	1.5	2.0	7.0	20	44	40
18	4.0	4.0	3.0	4.0	15.0	70	76	76
19	2.5	1.5	1.5	3.0	8.5	48	66	58
20	3.0	2.0	2.0	3.0	10.0	62	68	72
21	2.5	2.0	2.0	2.5	9.0	62	59	39
22	1.0	1.0	1.0	1.5	4.5	44	60	48
23	4.5	4.5	4.5	4.5	18.0	65	77	72
24	3.5	3.5	2.0	3.5	12.5	40	51	35
25	3.0	3.0	2.0	3.0	11.0	63	73	49

MATURITY VARIABLE SCORES FOR EIGHTH GRADE BOYS (continued)

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
26	1.5	1.5	1.5	2.0	7.5	59	33	37
27	3.0	3.0	3.0	3.0	12.0	56	73	64
28	2.0	2.0	1.5	2.0	7.5	52	12	23
29	2.0	2.0	1.5	2.0	7.5	49	74	59
30	2.0	2.5	2.0	2.0	8.5	46	67	57
31	2.5	2.0	1.5	3.0	9.0	59	69	56
32	2.5	2.0	1.5	2.5	8.5	60	38	42
33	2.5	2.0	1.0	2.5	8.0	61	54	58
34	3.5	3.0	2.0	3.5	12.0	59	83	64
35	2.5	2.0	1.5	2.5	8.5	71	69	67
36	3.5	3.0	2.0	3.5	12.0	47	35	55
37	2.5	2.0	1.5	2.5	8.5	63	69	73
38	2.5	2.0	1.5	2.5	8.5	60	79	57
39	2.5	2.0	1.0	2.5	8.0	43	65	54
40	2.5	2.0	1.5	2.5	8.5	57	83	78
41	1.5	2.0	1.0	1.5	6.0	53	39	42
42	2.0	1.0	1.0	1.0	5.0	49	43	16
43	2.0	2.0	1.0	2.0	7.0	56	60	48
44	2.0	1.0	1.0	2.0	6.0	54	70	68
45	4.0	4.0	2.0	4.0	14.0	50	49	73
46	4.0	2.0	1.0	4.0	11.0	51	49	57
47	3.0	2.0	1.0	3.0	9.0	44	78	71
48	1.0	1.0	1.0	1.0	4.0	53	71	73
49	3.0	1.5	1.0	3.0	8.5	59	69	68
50	3.0	4.0	1.0	3.0	11.0	43	34	50

MATURITY VARIABLE SCORES FOR NINTH GRADE BOYS

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
1	5.0	4.0	3.0	4.0	16.0	60	48	44
2	2.0	2.0	1.5	1.5	7.0	44	64	69
3	3.0	2.5	2.5	4.0	12.0	34	50	51
4	1.5	1.0	1.5	1.5	5.5	35	34	42
5	3.0	3.0	2.5	3.0	11.5	56	65	68
6	5.0	2.0	3.0	4.0	14.0	64	38	38
7	4.5	2.5	2.5	4.5	14.0	63	82	78
8	4.5	2.0	3.0	4.5	14.0	40	62	49
9	4.0	3.0	3.5	4.5	15.0	65	70	71
10	3.0	2.5	1.5	2.5	9.5	52	44	37
11	4.0	3.0	3.0	4.0	14.0	65	81	80
12	1.5	1.5	1.5	1.5	6.0	66	54	46
13	3.0	3.0	2.0	3.0	11.0	63	65	67
14	2.0	2.0	1.0	1.0	6.0	71	76	75
15	2.0	2.0	1.5	1.5	7.0	62	76	77
16	3.0	3.0	2.5	3.0	11.5	76	79	80
17	4.0	3.0	3.0	5.0	15.0	62	60	60
18	4.0	4.0	4.0	4.0	16.0	58	84	79
19	3.0	4.0	3.0	4.0	14.0	67	69	59
20	2.5	2.0	2.0	2.5	9.0	43	50	48
21	2.0	2.0	2.0	2.0	8.0	62	68	55
22	3.0	3.5	3.0	3.0	12.5	38	60	53
23	2.5	2.5	2.5	2.5	10.0	63	69	70
24	4.5	4.5	4.0	4.5	17.5	64	70	77
25	4.5	4.5	3.5	4.5	17.0	61	63	35

MATURITY VARIABLE SCORES FOR NINTH GRADE BOYS (continued)

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
26	4.5	4.5	4.0	4.5	17.5	52	47	46
27	4.5	4.0	3.5	4.0	16.0	62	47	55
28	4.0	4.0	3.0	4.0	15.0	69	52	62
29	4.0	4.0	3.0	4.0	15.0	67	71	67
30	4.0	4.0	4.0	4.0	16.0	52	60	66
31	5.0	4.0	1.5	4.0	14.5	58	49	36
32	3.5	3.5	3.0	4.0	14.0	62	42	48
33	5.0	5.0	5.0	5.0	20.0	57	56	44
34	4.5	4.5	4.0	5.0	18.0	61	72	64
35	4.0	3.5	3.5	4.5	15.5	52	51	46
36	5.0	4.5	3.0	5.0	17.5	65	56	49
37	4.5	4.0	3.0	4.5	16.0	58	67	61
38	2.5	3.0	1.5	2.5	9.5	52	43	51
39	3.5	3.5	4.0	3.5	14.5	52	60	51
40	3.5	3.0	3.0	3.5	13.5	63	65	69
41	3.0	2.0	2.0	3.0	10.0	62	53	60
42	4.0	2.0	1.0	4.0	11.0	64	69	67
43	3.0	2.5	2.5	3.0	11.0	64	72	78
44	2.0	2.0	1.0	2.0	7.0	52	74	66
45	2.0	2.0	1.0	3.0	8.0	62	71	78
46	2.0	2.0	1.0	3.0	8.0	64	52	52
47	3.0	2.0	2.0	3.0	10.0	64	83	79
48	3.0	1.5	1.0	3.0	8.5	54	63	65
49	2.5	2.5	1.5	3.0	9.5	64	59	56
50	3.5	3.0	2.0	3.0	11.5	66	55	43

MATURITY VARIABLE SCORES FOR TENTH GRADE BOYS

Student Number	Physical				Composite	Intellectual	Emotional	Social
	I	II	III	IV				
1	5.0	5.0	4.0	4.0	18.0	64	68	68
2	3.0	2.0	2.0	3.0	10.0	71	79	76
3	3.0	3.0	1.0	3.0	10.0	66	69	63
4	3.0	2.0	3.0	4.0	12.0	65	71	67
5	3.0	2.0	1.0	2.0	8.0	61	75	58
6	3.0	2.0	2.0	4.0	11.0	54	72	76
7	3.0	1.0	1.0	3.0	8.0	54	66	70
8	3.0	4.0	3.0	3.0	13.0	56	72	57
9	2.0	2.0	1.0	2.0	7.0	51	48	55
10	4.0	4.0	4.0	4.0	16.0	45	72	52
11	4.0	2.0	3.0	3.0	12.0	40	45	37
12	4.0	3.5	3.0	3.0	13.5	67	84	86
13	3.0	2.0	2.0	3.0	10.0	67	76	73
14	3.0	3.0	2.0	2.0	10.0	63	60	59
15	3.0	1.0	1.0	2.0	7.0	62	78	79
16	4.0	3.0	1.5	4.0	12.5	73	76	64
17	3.0	3.0	2.0	3.0	11.0	62	66	59
18	3.0	2.0	2.0	3.0	10.0	70	56	70
19	3.0	2.0	2.0	3.0	10.0	47	66	54
20	3.0	2.0	2.0	3.0	10.0	60	69	50
21	4.0	3.5	2.5	4.0	14.0	60	47	49
22	3.0	3.0	2.0	3.0	11.0	73	85	84
23	3.0	3.5	3.5	2.5	12.5	60	70	64
24	4.0	3.0	4.5	3.0	14.5	42	44	61
25	4.0	3.0	4.0	4.0	15.0	62	82	79

MATURITY VARIABLE SCORES FOR TENTH GRADE BOYS (continued)

[illegible]

APPENDIX F

PUBERTY RATING SCALE

Instructions: Place an "X" on each of the four criterion variable continua at the point which you think indicates the subject's maturity level. All four ratings in the applicable sex column must be completed. The continua range from complete non-pubescence (1) to full maturity (5). Ratings placed between whole numbers are counted as 1/2.

	<u>Male Criteria</u>					<u>Female Criteria</u>					
I. Pubic Hair	1	2	3	4	5	I. Pubic Hair	1	2	3	4	5
	None _____ Dense, Kinky Growth						None _____ Dense, Kinky Growth				
II. Axillary Hair	1	2	3	4	5	II. Axillary Hair	1	2	3	4	5
	None _____ Long and Coarse						None _____ Long and Coarse				
III. Facial Hair	1	2	3	4	5	III. Breast Development	1	2	3	4	5
	None _____ Terminal Hair on upper lip and chin						None _____ Full				
IV. Genital Growth	1	2	3	4	5	IV. Menarcheal Experience	1	2	3	4	5
	Infantile _____ Developed with wrinkled scrotum						None _____ Regular Cycles				
(Name) _____						(Grade) _____					
(Sex) _____						(School) _____					
(Rater) _____						(Rater) _____					